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ABSTRACT

This handbook is designed to meet the practical needs of three specific groups of K-12 educators and students: (1) those who are examining for the first time the possibilities of either their own use or their school's use of Internet services and resources; (2) those who are just beginning to use the Internet to explore different resources, and need help in becoming familiar with its many new concepts and procedures; and (3) those who are already experienced in using some Internet services and resources but who need a handy reference to specific Internet procedures, terms, and locations of special interest to K-12 educators and students. Because the Internet is a rapidly changing environment, this document includes only the most stable of network services of use to this group. Section I contains answers to questions most frequently asked by school Internet users in the following areas: the Internet in an educational setting; school support for an Internet connection; implementation and technical options; security and ethics; and educational collaboration, projects, and resources. Section II examines Internet search tools, which are organized into communication tools, tools for accessing online information, and other search tools. Section III presents a guide to K-12 Internet resources, including newsgroups, mailing lists, collaborative projects, interesting sites, and examples of educational projects using the Internet. A list of suggested readings, a glossary of terms, an index, and a quick reference sheet for Internet commands are also provided. (JLB)

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The Internet Handbook for School Users

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ERS Educational Research Service

The Internet Handbook for School Users

Educational Research Service
2000 Clarendon Boulevard
Arlington, Virginia 22201
Phone: (703) 243-2100
Fax: (703) 243-8316
E-mail: ers@access.digex.net

Sponsored by:

- American Association of School Administrators
- American Association of School Personnel Administrators
- Association of School Business Officials
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- National Association of Elementary School Principals
- National Association of Secondary School Principals
- National School Public Relations Association

ERS Executive Staff

Glen E. Robinson *President* *Director of Research*	John M. Forsyth *Vice President*

Handbook developed by

Nancy Protheroe, Research Coordinator and Elizabeth Wilson, Research Specialist
with the assistance of
Lorene Kluge, Research Specialist

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Foreword and Acknowledgments

The purpose of *The Internet Handbook for School Users* is to address the special needs of K-12 educators and students who are just beginning to use the Internet, as well as the needs of more experienced users of the Internet who need a ready reference for Internet procedures, terms, and locations that are of special concern to K-12 educators and students.

Development of this *Internet Handbook* began with the efforts of the Educational Research Service (ERS) staff to learn about Internet resources that could be used to assist schools and school districts in improving student learning.

Our initial questions were much the same as those that you have asked, or will be asking. What is the Internet? How do we connect to it? What is out there that would be of value to us? Is what we're likely to find going to be worth the time, effort, and money we will need to invest?

The search for answers was exciting but often frustrating. Information in the existing guides to the Internet often jumped quickly from brief descriptions to detailed and complicated explanations that were difficult to understand.

In our search, we found a document that was especially helpful: *FYI on Questions and Answers: Answers to Commonly Asked "Primary and Secondary School Internet User" Questions.* It is distributed on the Internet as RFC 1578/FYI 22, and originates from the Internet School Networking working group of the Internet Engineering Task Force (IETF).

In the development of this *Handbook*, ERS borrowed heavily from this helpful document. On behalf of school users, ERS expresses gratitude and appreciation to the Internet School Networking working group of the IETF for their pioneering work.

As ERS staff members became experienced in use of the Internet, more detail was added to descriptions of Internet tools, along with examples of how to use the tools. Specific information sites that educators and students might want to visit on the Internet were also added, along with descriptions of what might be found when one arrives at the site. Examples of possible school uses were also included.

Many of these examples demonstrate the collaborative nature of the Internet. People are continuously asking for and providing information as well as inviting others to participate with them on Internet projects. The inclusion of brief descriptions of sample educational projects in this publication makes the Internet easier to understand, while suggesting possible applications for new users. ERS acknowledges with appreciation the contributions that others have made to the contents of the *Internet Handbook* through their use of the Internet as an educational resource.

Special recognition is due two ERS staff members – Nancy Protheroe, Coordinator of Research Studies, and Elizabeth Wilson, Research Specialist – for applying their extensive experience and insight with the use of Internet services and resources to the development and publication of *The Internet Handbook for School Users.*

We sincerely hope that you will find the *Handbook* practical and helpful in your experience with use of the Internet.

Glen E. Robinson
President, ERS

Introduction

There is great interest and concern among various sectors of the K-12 education community – both educators and students – about how to use the new "information superhighway" and its major component, the Internet, in ways that are educationally sound and cost-effective. Of particular interest is the goal of providing Internet access to all schools.

The Internet Handbook for School Users is designed to meet the practical needs of three specific groups of educators and students in this rapidly changing and challenging communications environment:

1) those who are examining, for the first time, the possibilities of either their own use or their school's use of Internet services and resources;

2) those who are just beginning to use the Internet to explore different resources, and need help in becoming familiar with its many new concepts and procedures; and

3) those who are already experienced in using some Internet services and resources but who need a handy reference to specific Internet procedures, terms, and locations of special interest to K-12 educators and students.

Depending on your level of familiarity with the Internet and computing, some sections of this Handbook will be more relevant and comprehensible than others. The best strategy for using the Handbook is to focus on those sections that are of greatest interest to you now; once you gain more familiarity with the Net, the sections that you initially skipped will be more comprehensible and more helpful.

We also recommend that, as you read through the *Handbook*, you refer to the glossary beginning on page 91 to assist with any terms or concepts you do not initially understand. Other sources of assistance include the Index (page 101) and the Quick Reference Sheet for Commands (last page), which contains useful commands for Internet tools.

Since the Internet is a rapidly changing environment, this *Handbook* includes only the most stable of network services when listing resources and groups that K-12 educators and students can contact through the Internet. But even this approach cannot guarantee accuracy. Offerings on the Internet are constantly changing, as some services are restricted to a particular group of users, other services are dropped entirely, and still more are added.

This constant change also means that as you explore the Internet on your own, you will discover new resources. At the end of the *Handbook*, space is provided for you to note information about sites you find on your own. This exploration and discovery process has a value beyond the information found. It actually becomes an interactive teaching/learning process in which the expanding knowledge of available resources broadens one's perspective of further Internet possibilities.

We have made every effort to verify and check the information contained in this *Internet Handbook*, but we know only too well that the Internet environment changes so rapidly that specific items will become out of date. Therefore, we urge readers to call to our attention any changes or discrepancies that you find. We also welcome any suggestions that you may have for future editions of the *Handbook*, as well as comments about the ways in which you have put it to use in your own school.

Two forms have been included at the end of the *Handbook*: one for writing down your suggestions, the other for you to tell us how you have used the Internet in your school or district. Please address your information to the attention of either Nancy Protheroe or Elizabeth Wilson. You may contact them through e-mail: ers@access.digex.net, by fax: (703) 243-8316, by telephone: (703) 243-2100, or by mail at the ERS postal address: 2000 Clarendon Boulevard, Arlington, Virginia 22201.

Section One

Answers to Questions Often Asked by Current and Potential School Internet Users

This handbook is written with several audiences in mind: those who do not yet have Internet access but are interested in what the Internet can offer them; those who have already begun their Internet exploration and would like some tips and pointers about online resources; and those who are dealing with logistical and technical aspects of connecting to the Internet. Therefore, some questions may not be relevant to you now and could be skipped or simply browsed. For example, in this section, the questions about educational projects would be of particular interest to those who want to involve students in Internet projects, whereas the questions about school support for an Internet connection are technical and would be more helpful for those who are leaders in implementing technology at their school sites. We recommend that you browse through this section and concentrate on those questions that are most interesting and relevant to you.

The Internet in an Educational Setting

What is the Internet?

The Internet is a collection of more than 10,000 interconnected computer networks around the world that make it possible to share information almost instantly. The networks are owned by countless commercial, research, governmental, and educational organizations and individuals. There are currently more than 15 million users of this giant network. With an estimated growth rate of about ten percent per month, the size could triple within a year.

Users of the system can collaborate easily and quickly through messaging, discussion groups, and conferencing; they are able to discover and access people and information, distribute information, and experiment with new technologies and services. The Internet has become a major global infrastructure for education, research, professional learning, public service, and business.

Four interesting things you could do on the Internet:

1) Join a discussion group for K-12 educators around the country.
2) Download publicly available software to your computer.
3) Take part in a cross-curricular collaborative project aimed at producing a collection of students' folklore.
4) Find out the weather forecast for any city in the U.S.

What are the benefits for K-12 educators of using the Internet?

The Internet can expand classroom resources dramatically by making resources from all over the world (including original source materials) available to students, teachers, and administrators. It brings information, images, and even computer software into the classroom from places otherwise impossible to reach, and it does this almost instantly. Access to these resources can yield opportunities for collaboration, curriculum materials, and idea sharing that are beyond the reach of schools without Internet access.

Internet access also makes contact with people all over the world possible, bringing into the classroom experts in many content areas, new and old friends, and colleagues in education. With access to the Internet, you, your class, and your school can be a valuable *source* of information to others on the Internet, as well as a user of its resources. Consider experiences in your class or in your school that could be shared with others around the nation and the world.

The isolation inherent in the teaching profession is a concern often expressed by educators. By having access to colleagues in other parts of the nation and the world, educators who use the Internet are not as isolated. If used effectively as a hands-on classroom tool, the Internet can encourage the kind of autonomy among students that many educators agree is critical to the learning process. Because class, race, ability, and most disabilities are removed as factors in communication on the Net, it is a natural tool for addressing the needs of nearly all students.

The KIDLINK networking project, which brings together thousands of children from around the world ages 10-15, received worldwide media attention in 1991, when children in Israel used the online forum KIDCAFE to tell their peers about the Gulf War – while it was happening.

The Top Three Incentives for Using Telecommunications as a Professional Resource, as Rated by Teachers*

(1=strongly disagree, 6 = strongly agree)

1) *The opportunity to communicate with other educators, share ideas, obtain information, and get feedback is valuable* 5.4
2) *Telecommunications affords me access to information that would otherwise be difficult to get my hands on* 5.1
3) *Telecommunications is an effective tool for combating isolation that so many educators experience as part of their jobs* 4.9

* *Telecommunications and K-12 Educators: Findings from a National Survey.* Center for Children and Technology at Education Development Center, New York, NY: 1993.

How can educators incorporate this resource into their busy schedules?

Most educators learn about the Internet during the same time they use to learn about most other new teaching tools or resources. Realistically, of course, this means they take time at lunch, on weekends, and before and after school to explore resources and pursue relationships via the Internet. Those who do so feel that it is well worth the rich rewards. Districts and schools can help by ensuring that computers used to access the Internet are readily available and close enough to be convenient.

Many features of the Internet, such as the availability of online library catalogs and information articles, will actually end up saving considerable time once the skills to use them are developed. There are also new tools being developed constantly to make Internet resources more accessible for the novice as well as the experienced user. As staff and students increase their use of the Internet to answer questions, to work on projects, or to learn new things, the issue of time needed for access will become less relevant. As a communications network, the Internet will sometimes replace rather than merely supplement more traditional research approaches, such as card catalogs and staff development sessions.

I'm already using the National Geographic Kids Network (or PBS Learning Link, or FrEdMail, or America Online, or ______). Does this have anything to do with the Internet? Is the Internet different from what I'm already using?

Since the Internet is a network of many different networks, you may already be using one that is connected to the Internet. Networks like FrEdMail (Free Educational Electronic Mail), FidoNet, and K12Net are bulletin board systems (BBSs) and conferencing systems linked via the Internet that provide inexpensive access to some Internet resources. Online services such as America Online and Delphi also offer Internet access as one of their services (see pages 14-15 for more information). If you can currently use *interactive* computer access (Telnet) as well as electronic mail, you are probably "on" the Internet. If you have questions about whether you have Internet access, what aspects of the Internet are available to you, and – if you have access to services – how to use them, contact your service provider's support personnel.

Networks: Where Have You Been All My Life?*

My name is Randy, and I am a junior in Washington State. I am totally blind, with two glass eyes. I have been blind all my life, and have never known anything different. I have been mainstreamed in schools all my life, and I have always depended on others to get me school materials. If I needed or wanted a book for class, it had to be transcribed into braille or put on tape. However, in August of last year a whole new door was opened to me. I am a member of the DO-IT (Disabilities, Opportunities, Internetworking, Technology) Program at the University of Washington. This program gives high school students with disabilities the chance to overcome their challenges by the use of the Internet.

Getting Internet access was the best thing that ever happened to me. In a way, my computer and access to the net has become my eyes to the world. I can read a newspaper, talk to people around the world, and get materials for class papers, unlike before when I had to depend on others to get the resources I needed. Upon receiving my access in August of 1993, I was able to read a newspaper for the first time in my life. This may sound trivial, but to me it was a great accomplishment. I was not aware of the variety of topics covered by newspapers. I knew about the front page, feature articles, and sports section, for instance, but I did not know of the huge amount of stories in these sections. I was amazed. Before getting access I had to get sighted people to read me the paper. However, with the help of a screen reader, I browsed through an online paper, found what I wanted to read, and read it. Not only can I read the Washington Post, but also the Moscow News, and several other papers mainly used by scientists.

Many of you know of IRC or some other type of chat system. This caught me by surprise when I first started on the net. I am taking German in high school, and plan to be a foreign language expert. If I want to try out my German on people, I just telnet to Germany, and try it on actual Germans. Another aspect of the chat systems is talking to people about current events. I can telnet to a chat system and talk to people from California about the earthquakes there, or from Kansas City and ask about the Chiefs' chances in the Superbowl. Thus, the net is a tool for me to get feedback from people all over the world on what they think of different things, and it's an interesting way to make new friends.

But the best aspect of the net is the ability to get information on any topic. There are lots of ways to do this. First, you can join a listserv and find out about a topic from experts. Second, you can e-mail an expert in a field with a question and get an answer to your question quickly. But the best way to get materials is through Gopherspace. I recently needed information on Poland. I entered Gopherspace, moved to a server in Poland itself, and there I found all the information I needed on my subject. Also, there are encyclopedias, dictionaries, and thesauruses in Gopherspace. If a server does not have the information you need, you can just find another that will either have the exact material, or one that has some sort of information book and use it to get the information you need.

In closing, the Internet has become a great part of my life. In the seven months that I have had access to the net, I have built up over two hundred hours on it. I use it to find out about current events, do research papers for school, and just talk to people about everyday life. I would recommend the Internet to anyone that needs these services. It is hard now to remember how I lived without this wealth of material and information at my fingertips.

* *In January and February 1994 the National Center for Education Statistics, the NASA K-12 Internet Project, and the National Science Foundation jointly sponsored an essay contest open to all U.S. students from pre-kindergarten to twelfth grade. In their essays, entitled, "Networks: Where Have You Been All My Life?", students were asked to describe their most significant learning-related telecommunications experience. Several winning essays are scattered throughout this handbook.*

School Support for an Internet Connection

The challenge facing those advocating an Internet connection sometimes has less to do with the actual cost than with the difficulty of deciding to spend money on an unfamiliar resource.

Although many school budgets are extremely tight, the cost of a low-end Internet connection can be quite reasonable, particularly if the basic hardware and software needed are already available. (See the next question, on page 8.)

In order to move the Internet connection closer to the top of your district or school's priority list, consider at least two possibilities. First, because use of the Internet shifts focus away from a teacher-as-expert model and toward one of shared responsibility for learning, it can be an important part of school reform. Much of school reform incorporates efforts to move away from teacher isolation and toward teacher collaboration, away from learning in a school-only context and toward learning in a life context, away from an emphasis on knowing and toward an emphasis on learning, away from a focus on content and toward a focus on concepts.[1] The Internet can play an integral part in helping to achieve these shifts.

Second, when demonstrating the value of a connection, it is more useful to expose others to actual Internet access than to describe it in words. While this may sound like a chicken-and-egg situation (we have to have Internet access to get Internet access), some Internet network providers will offer guest accounts on an Internet-connected computer to people in schools who are trying to convince others of the value of an Internet connection.

Contact local colleges, universities, technology companies, network providers, community networks, and government agencies for both guest accounts and funding ideas. For alternatives to your own school's budget or for supplements to it, look for funding from federal, state, and district sources as well as from private grants. Work with sources as well as from private grants. Work with equipment vendors to provide the hardware needed at low or no cost to your school, and consider forming a School/Community Technology Committee.

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[1] "Restructuring Schools: A Systematic View" in *Action Line*, the newsletter of the Maryland State Teachers Association, a National Education Association Affiliate. R. Kuhn, Editor. No. 93-6. June, 1993.

The Educational Resources Information Center (ERIC) has information on grants and funding. Ask for the AskERIC InfoGuide called *Grants and Funding Sources*. Contact AskERIC by e-mail (askeric@ericir.syr.edu) or by phone (315/443-9114). Two network services, one maintained by the United States Department of Education's Office of Educational Research and Improvement (OERI) and one maintained by the National Science Foundation, also have information about grants and funding. All of these network servers are listed under "Interesting Sites to Visit Through the Internet," beginning on page 72. Grants can be a way for you to acquire the initial money to demonstrate the value of telecommunications in the classroom, but since these monies are often awarded on a short-term basis, they should not be viewed as a permanent means of funding your activities.

How much does it cost to connect to the Internet, and what kind of equipment (hardware, software, etc.) does my school need in order to support an Internet connection?

The cost of Internet access varies greatly with the location of your site and the kind of connection that is appropriate to your needs. Education networks in many states provide low-cost or no-cost Internet access (see page 18 for more information). For example, Virginia's Public Education Network provides free Internet access for people employed by a public school system in Virginia, as well as for public school students (under the condition that the student signs the "Acceptable Use Policy" and obtains consent of a teacher and a parent). Teachers in Texas can access the Internet for $5 per year. In order to determine the cost to your school, you will need to answer four questions:

1) What equipment (computers, modems, etc.) is already available?

2) Who and how many people will be provided with access to the Internet? Will more than one person need access simultaneously?

3) What Internet services are needed (e-mail only, all services, etc.)? (See the "Accessing Internet Resources" section, beginning on p. 37.)

4) Are special no cost/low-cost connections available to school personnel in your state through, perhaps, the state department of education? Or does your school already subscribe to an online service such as America Online that includes at least some access to Internet services?

To give you an idea of possible *equipment* needs, below are three possible scenarios. Keep in mind that these are very general examples and that there are many solutions at each level. Following the three scenarios is a chart that compares the advantages and disadvantages of each.

- **Low-end connection:**

You could just subscribe to some kind of Internet dial-up service. Dial-up Internet connections allow you full access to the Internet's resources, such as Telnet and FTP, and you also have the ability to send e-mail. This type of connection may be provided by a local university gratis, as a part of a state department of education program, or by a vendor at a cost. You will need a computer, communications software that has a "terminal emulation" mode (most do), and a modem that is compatible with your dial-up service.

Almost any kind of computer can be hooked up to the Internet. The minimal requirements for connecting to the Internet are a computer, a modem, and a communications software package that has the ability to emulate the activities of a terminal.

Ongoing costs will include the charge for each telephone call (if access is gained through a non-local telephone number, but local numbers are readily available in urban areas) plus the monthly or annual fee. For those using a commercial provider to gain access to the system, the charge can be as low as $10 per month for basic service (perhaps five hours per month) with additional charges for extra hours spent connected to the service. Other services may charge $30 or more and increase the number of "free" hours accordingly.

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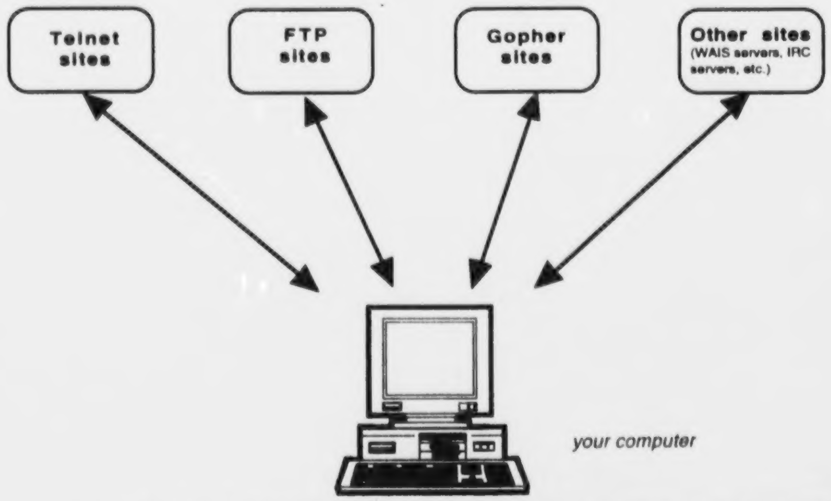
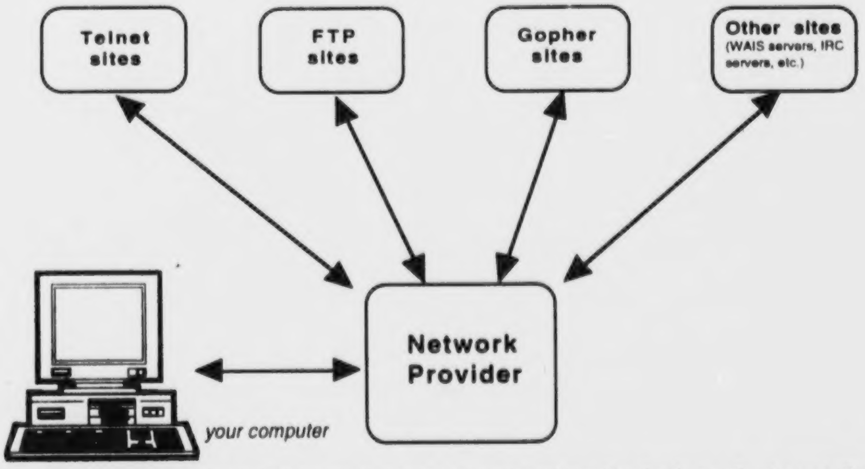
Direct vs. Dial-Up Connections: What's the Difference?

A Direct Connection


Telnet sites
FTP sites
Gopher sites
Other sites (WAIS servers, IRC servers, etc.)
your computer

Your computer is a "host" on the Internet, through which you can connect directly to the Net without having to dial up a network provider. Not only is your computer able to connect quickly to other sites (Telnet, Gopher, etc.), but you can also share its resources with the Net, perhaps by setting up a Gopher or FTP site. Any Internet user in the world could thereby access what your site has made available. An example host is a university computer that makes campus newsletters or files on alumni information available at a Gopher site; all interested people with Internet access could reach this Gopher and tap into its resources.

A Dial-Up Connection


Telnet sites
FTP sites
Gopher sites
Other sites (WAIS servers, IRC servers, etc.)
Network Provider
your computer

Your computer uses a device called a modem to dial up a network provider that has a direct connection to the Internet. You're not technically "on" the Internet, even though you are able to access Telnet, Gopher, and FTP sites the same way a person with a direct connection could (their connection is of a much higher speed, though). The network provider is a host that is offering to let your computer's terminal emulate the activities of one of their terminals which is connected to the Internet. You don't have the capability to share your resources with the rest of the Net by setting up a Gopher or an FTP site, but you are able to contribute your ideas and resources by such means as e-mail or posting a message to a listserv or a newsgroup.

- **High-end connection:**

If you have a local area network, or LAN (that is, if computers in your building are networked together), then your district or school could subscribe to a service that provides a full Internet connection to your local area network. This gives all the computers on the local area network access to the Internet.

By connecting directly to the Internet, your site would act as an Internet "host." In this context, the term "host" describes a computer that connects directly to the Internet without having to dial up a network provider. A host computer has several capabilities beyond that of a computer that accesses the Internet via dial-up means: the host connects much more quickly to remote sites; if it is connected to a local area network, more than one user at a time has Internet access; and it can share its resources with the rest of the Net, for example by setting up a Gopher or an FTP site of its own. See the figure on the opposite page for further information on the differences between direct connections and dial-up connections.

You will need a router (equipment that permits use of a telephone line by multiple users simultaneously) and a connection to a network access provider's router. Typically the connection is a leased line with a CSU/DSU (Channel Service Unit/Data Service Unit). A leased line is a permanent high-speed telephone connection between two points; this allows you to have a high-quality permanent Internet connection at all times. A local area network, which may only consist of the router and a personal computer system, is also needed, and your computer(s) will need some special software: a TCP/IP (Transmission Control Protocol/Internet Protocol) stack, as well as TCP/IP-based communications software such as Telnet and FTP. Setup for this connection will be highly technical in nature, and ongoing technical support will be necessary. The approximate cost, not including the computers, is $2,000 to $3,000 plus a monthly fee of at least $120-$200.

- **Mid-range connection:** A third option is to subscribe to a dial-up service that provides Serial Line Internet Protocol (SLIP) or Point to Point Protocol (PPP), allowing your computer to have "host-like" capabilities. By keeping the connection open and with the right software, you could make your resources available on the Internet by setting up an accessible site, such as a Gopher site. This type of connection also allows you to use more sophisticated software, such as Mosaic, which has a graphical interface and point-and-click capabilities, making the Net much easier for novices to navigate.

SLIP/PPP users can connect by dialing up a service provider, and they also have the option of arranging for direct phone line service through their telephone provider. For this reason, this type of connection does not easily fit into the either the "direct connection" category or the "dial-up connection" category.

In order to establish this type of connection, you will need a computer with software for SLIP/PPP connections, telecommunications applications software (to allow you to use Telnet and FTP), and a modem that is compatible with your dial-up service. The equipment setup charges (software, modems, etc.) for the mid-range connection level are higher than those required by the low-end alternative, and the required setup is *significantly* more technical. Monthly charges are also higher – they may be as low as $40, but would likely be $60 per month.

Comparison of Advantages and Disadvantages of the Three Connection Levels

	Advantages	Disadvantages
Low-end connection	• Flexibility: in most cases, you can use any communications software to connect. • Ease of use: little technical knowledge of the Internet or of communications technology is required. • Expenses are minimal.	• Access by only one school user at a time is likely. • Connection does not support some of the Net's more interesting features, such as Mosaic (a browser for the "World Wide Web" which has special sound and graphic abilities – see p. 64). • The connection is low-speed.
Mid-range connection	• More sophisticated software can be used on your computer. For example, you can run software for the Macintosh that gives you point-and-click capabilities as you read Usenet News. • You can use special software such as Mosaic or Cello to explore the Internet. • You save a step in downloading files – you can copy a file directly to your home computer. • By leaving the connection open and with the right software, you can act as a host on the Internet.	• You will need much more technical knowledge of the Internet than would be required by the low-end option. • You will have to find the software and pay for it. • Monthly charges would be higher than those of the low-end option.
High-end connection	• You can work at very fast speeds. • More than one user at a time will have access to the Internet. • Your computer can act as a host on the Internet, sharing resources with other computers on the network who dial up your computer. • Since almost all Internet utilities have been developed for this type of connection, a direct local area network connection optimizes all the most powerful utilities.	• The setup costs and the monthly fees are substantial. • There will be a need for ongoing technical support at your site.

What are some alternatives to *full* Internet access that still enable me to network?

There are several alternatives to the three levels of connection mentioned previously. One is a "store-and-forward" system. FrEdMail, FidoNet, and K12Net are all examples of such systems; a local store-and-forward network could be created at your own site as well, given the right software. "Store-and-forward" means that Usenet News and e-mail are "stored" on a computer until the time appointed for that computer to forward the information to the next one along the path to the final destination.

This system is much more affordable than full Internet access, since such networks provide more efficient use of telephone lines, making a connection only when data is actually being transferred. FrEdMail also brings the connection costs down by taking advantage of late-night telephone rates – e-mail and news are forwarded in the middle of the night rather than immediately after they are written. In a well-designed FrEdMail program, students do most of their writing offline, and the phone line is used only occasionally, when a batch of student writing is transmitted all at once.

If you set up your own store-and-forward network, you can filter the material, which gives a school some control over the kind of information that is available to its students. The disadvantage of this type of Internet access is that the range of Internet applications you can use may be limited. For more information about FrEdMail, call 619/475-4852 or send e-mail to **arogers@bonita.cerf.fred.org**. For information about FidoNet, call 503/280-5280 or send e-mail to **jmurray@psg.com**. For information about K12Net, gopher to **gopher.psg.com**.

Another alternative is to sign up with one of the nationwide commercial online services such as America Online, Compuserve, MCI Mail, Delphi, or Prodigy. (All of these companies have 800 numbers that can be obtained by calling Information at 800/555-1212.) Some of these services provide only e-mail access to the Internet, others provide additional Internet services, and others provide full Internet access. They all charge a monthly fee ranging from $5 to $10, which includes several hours of free online time, after which you are billed by the hour for your time online. The extent of Internet access available through each of these services is expanding rapidly as more customers express interest in it. If you decide to get Internet access this way, ask about three things: the Internet resources available, the charges (monthly? hourly? extra for Internet?), and the availability of a local phone number for dial-up Internet access.

Finally, a third option is to connect through a local electronic bulletin board system (BBS). BBSs often have e-mail gateways to the Internet. Accounts with these BBSs may be free, or may cost up to $30 a month. Because BBSs are local, you never have to worry about long-distance calls.

What personnel are required to support an Internet connection?

The answer to this question addresses two potential needs: training of *users* of the Internet and training of staff required to establish and maintain the Internet connection.

The time required for the first is minimal but important. Any plan for implementing technology in schools should first consider staff development. Training is often the most neglected aspect of a technology plan, and a lack of training can lead to its failure. In the case of the Internet, all users will need some kind of training, whether they are teachers, librarians, students, administrators, or people fulfilling other roles in the school.

> ***Any plan for implementing technology in schools should first consider staff development. Training is often the most neglected aspect of a technology plan, and a lack of training can lead to its failure.***

The train-the-trainer model, in which a group of people are trained in a subject or tool and each individual in turn trains other groups, is a good model for Internet training. A small group of motivated teachers and other staff can be trained and can then train their colleagues. One advantage is that the initial group is able to target the specific needs of the other teachers in a school or district.

The second aspect – establishing and maintaining the connection – is not time-consuming if you select the dial-up, low-end option. Someone needs only to understand how to connect a modem and how to use basic communications software.

If the mid-range or high-end alternatives are selected, there will be a need for *ongoing technical support*. Therefore, this question should be considered seriously when making decisions about the type of connection desired. Providing such support, which is not usually in place, may be a problem. Some districts are beginning to provide it at the district level. Some schools are able to use volunteers from business, industry, or government agencies. Much of this type of support can be done over the network itself, which makes it possible for someone located off-site to maintain the equipment with only occasional trips to the school. Additionally, vendors often provide some support, perhaps a help desk for basic questions.

Networks: Where Have You Been All My Life?*

By Troy, a sixth-grader in Maryland

We like to read stories that come from all over the world to our school. In Hawaii they sent me some Hawaiian words to learn to say to other people. In Social Studies, we learn how to use the atlas to find other countries in the world. In Social Studies, we also use the computer to send e-mail to Olya in Ekaterinburg, Russia. In math we play Math Blaster and try to get the highest score to beat the kids in England. We write lots and lots of things on the computer. We write stories like about Martin Luther King, Jr's. birthday for the KIDLINK Multi-cultural calendar and black history month. Back then when my mom went to school they didn't have things that we have nowadays. Like computers.

Our school sends our minds all over the country and the world. They send back to us what they have to say in their minds. Their thoughts are different from ours sometimes when they think about what is going on around the world. Sometimes their ideas are the same. I hope when we get in seventh grade that we have the network there because it is fun to work with. Current events are coming all over the place in the world, like the earthquake. It damaged many peoples' houses and now President Clinton is trying to help the poor people get their houses back.

The 6.6 earthquake shattered the whole neighborhood and it broke down in a million pieces. Many people survived the earthquake. Our school got a report from an area of Los Angeles. We got it through the network. It was from a teacher. It talked about earthquake drills. In California they have drills about once a month and in California they have drills with mock injuries which means they're fake.They pretend like they have injuries. We have fire drills instead of earthquake drills. They have hard helmets for the search and rescue teams and also crow bars. The teachers take ribbons and tie around the door so the search and rescue team can know where injured people are. It made me feel sad about the earthquake about all the people that died. It made me feel good to find out that they had practice drills to help keep them safe in the earthquakes.

We participated in the virtual reality pretend vacation. We made up a three day vacation for people to come to our town. We told them about where the good place to stay is and some good places to eat like McDonalds. We sent our report over the network. Some kids in Finland wrote to us and asked us what was Thanksgiving? I told them what it was about. It's about sharing with other people and being with your family and giving grace to God. We told them that turkey is real good to eat and ham, fruit, greens, beans, potatoes, and pies. They said that they had a big feast and a play about Thanksgiving. They learned about what Thanksgiving is from us.

The reason why I like to work with the Network is to talk to other people in the world. Before I thought some things were boring but you can talk about disabilities and street kids and that's another thing that we talked about and it wasn't boring for any body to write about and read. Also it was fun to add on to other peoples stories and the people that started it in Arizona were telling a good story. It was fun to add on and make it more funny. I feel sorry for the people who don't have a network at their school.

* *In January and February 1994 the National Center for Education Statistics, the NASA K-12 Internet Project, and the National Science Foundation jointly sponsored an essay contest open to all U.S. students from pre-kindergarten to twelfth grade. In their essays, entitled, "Networks: Where Have You Been All My Life?", students were asked to describe their most significant learning-related telecommunications experience. Several winning essays are scattered throughout this handbook.*

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How do I learn about options for getting my school connected?

In the United States, there are a number of statewide educational networks, many of them with access to the Internet. To find out whether there is a state education network in your area that provides accounts to educators and/or students, contact your state department of education, or the Consortium for School Networking at **info@cosn.org** or 202/466-6296. If this type of access is unavailable, an account can be established through a commercial network provider; contact the InterNIC at 800/444-4345 or **info@internic.net** to request an updated list. Or send e-mail to **info-deli-server@netcom.com** with the message **send pdial**, and you will receive a list of dial-up access providers in the United States.

Maryland has recently become the first state in the nation to offer its residents full Internet access. This new service is a project of the state's library system. Participation requires payment of a nominal monthly fee.

You can sometimes locate a person who is enthusiastic about using networks in schools and willing to help you and who works as an independent consultant, in a local college or university, in a technology company, for a network access provider, at a community network, or in a government agency.

There are a number of books about the Internet that discuss in detail how to get connected. A few are listed in the "Suggested Reading" section, and more are constantly being published. Check libraries, bookstores, and booksellers' catalogs. We recommend one source in particular: "K-12 Internetworking Guidelines." This document provides technical guidance to help you connect your school to the Internet. To get a copy, call InterNIC at 800/444-4345. If you are already on the Internet, you can get them by anonymous FTP to **ds.internic.net**; the file, which is located in the **internet-drafts** subdirectory, is called **draft-ietf-isn-k12-guide-01.txt**.

Can we provide Internet access through more than one computer in the building?

If your school's computers are already networked, hardware/software that allows any node to connect to an outside line and service can be provided. If only *one user at a time* will require access to the Internet, a routing device will not be necessary.

Questions to Ask a Potential Provider

- ***Do you charge a flat monthly (or quarterly) fee, an hourly rate, or some combination of the two?*** Unless you will be using your connection only occasionally, it's best to find a provider that charges a flat monthly rate.
- ***Can I dial up via a local or 800 number to get access? Will using the 800 number cost me additional money?***
- ***How many lines do you have available? How often are they busy?***
- ***What modem speeds do you support?*** Your provider should support at least 9600 bps access. Even if you have a slower modem now, faster ones are quickly becoming the standard and are decreasing in price.
- ***Do you provide Telnet, FTP, and disk space?***
- ***What tools do you have available locally?*** You can telnet to just about any tool, but better systems will have Archie, Gopher, and WWW clients locally.
- ***What newsgroups do you subscribe to?***
- ***Do you allow access by children?***
- ***What kind of technical support can I get?*** The better services will have both online and voice support.
- ***What training is available? Is it included in the cost?***
- ***Who else buys service from you?***

However, if you are going to connect several computers to the network, which might need *simultaneous* access, then you will need to provide routing equipment and ensure that your phone line speed is adequate. (Line speed is determined by your modem and the connection that is available through your service provider.) When deciding what line speed is appropriate, consider the number of potential users in the school or district, as well as the network utilities they will be using (a speed suitable for e-mail may be too slow if the primary use will be file transfer).

A second consideration when there will be multiple users in a district or school is the number of e-mail addresses that will be needed. If each administrator or teacher is eligible for a "private" account through a program such as that available in Virginia, having numerous e-mail addresses is not a problem. However, if your district or school must use a commercial provider, the cost may increase if multiple e-mail addresses are needed. In that case, desires for privacy of communications must be balanced against budget constraints. (If people do not have their own individual e-mail addresses, all e-mail would come to a common mailbox, and be accessible by all users.)

If a local area network is not available in your district or school, any computer needing Internet access requires a modem, communications software, and access to a telephone line. This line could be shared, with jacks hooked to the same line in several locations. However, this arrangement would permit access by only one person at a time.

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Should we provide Internet access on a central computer, or to computers in each classroom or office?

When making this decision, three options are available:

1) having one central computer with Internet access (allows only one user at a time on only one computer; the computer must have a modem, communications software, and access to a telephone line);

2) having more than one non-networked computer (users can access more than one computer, but all computers must have modems, the appropriate software, and access to a telephone line); or

3) having a system of networked computers (users can access the Internet from all networked computers, and only one computer must have a modem, software, and access to a telephone line).

For both the second and third options, the availability of simultaneous Internet access by more than one person depends on the password system used by the service provider. It may be that a school with only one account may have only one person logged on at a time.

Networking all computers school-wide or building-wide can be expensive. You will need to consider the options – dial-up access, a dedicated line, or some other possibility – and weigh them against your school's needs and priorities. You may want to investigate having one lab, the library, and a few classrooms with modem access, assuming phone jacks/lines are available. As more districts and schools are networked for other reasons, it may be more efficient to provide Internet access through a dedicated line and routing equipment than to keep adding modems in classrooms.

Some Information About Networks

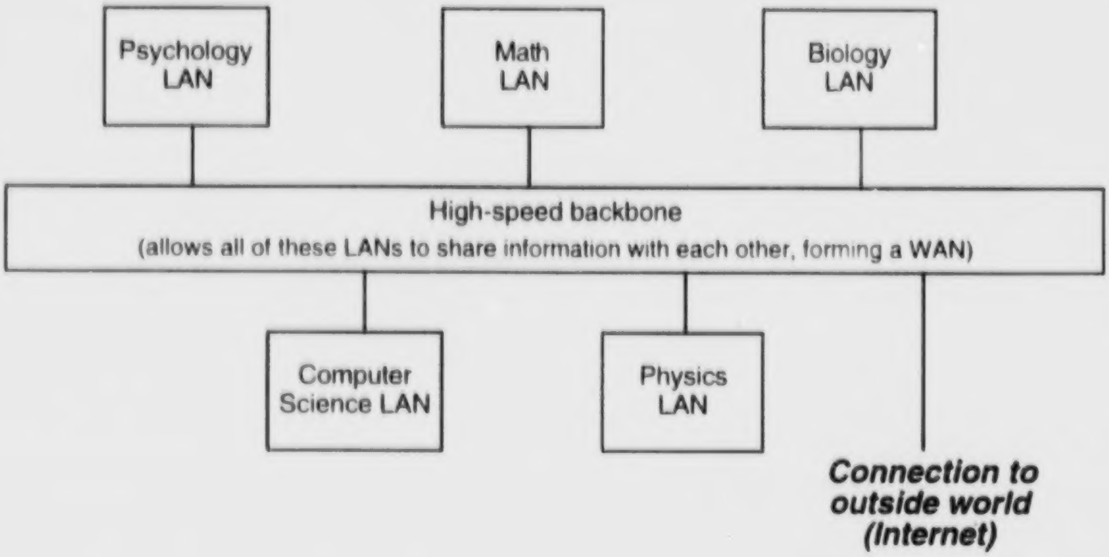
What is a network?

When two or more computers are connected together to share resources or communicate, they form a network.

A familiar example of a network is a Local Area Network (LAN). A LAN is a network that connects computers in a relatively small area, such as an office building. For instance, an insurance company's computers might be connected via a LAN. All of the company's computers share the insurance information, and if you called the company to change your policy, any employee at any computer would be able to bring your information up to their screen. The updated information would then be automatically available to all other networked computers. This is possible because the computers are connected via a Local Area Network.

LANs can be connected to other LANs. For example, a university might have several LANs, such as LANs for the Psychology department, Math department, Biology department, Computer Science department, and Physics department; these LANs could be connected through a high-speed backbone to share their information with each other, thus forming what is called a Wide Area Network (WAN). If the university has a direct connection to the Internet, then it is part of the global "network of networks" that we call the Internet.

Here is an example of one hypothetical network that has a direct Internet connection: a network at a university.


Psychology LAN
Math LAN
Biology LAN
High-speed backbone
(allows all of these LANs to share information with each other, forming a WAN)
Computer Science LAN
Physics LAN
Connection to outside world (Internet)

Can staff or students get on the Internet from home?

This is certainly a possibility and is probably desirable for staff in your school or district if they happen to have the necessary equipment at home. Normally all that is needed is a password in order to access the "provider." This is another area where the number of accounts/passwords needed should be discussed. Many commercial providers only permit one active connection per password. If all teachers in a school were using a single account, this would mean that only one teacher at a time could be connected, even if they were all using different home phone lines.

You will need to decide whether you want to make this option available to students even if it is possible technically, This might be discussed with the community your school serves in a public forum such as a school/community meeting. At issue is the shared responsibility of educators and parents to monitor student Internet use. (See the "Security and Ethics" section for more on this topic.)

Where do I go for technical support and training?

Often the best place to start is with your network provider; the provider knows the limitations of the level of access that you are receiving/purchasing, and the commands you will need to access available services.

Much additional support and training can be found by using the Internet itself. You can send questions to people who have expressed their willingness to help or join discussion lists and newsgroups that discuss and answer questions about the Internet issues in which you are interested. One such list is Tipsheet, the Computer Help and Tip Exchange (see page 70), the purpose of which is to provide a supportive setting where people can ask questions or discuss products. Also, many of the education-related mailing lists serve as forums for technical support (see page 69).

Once you acquire your initial training, it will be essential to keep up to date on the latest Internet developments. Good sources for updating your knowledge of cyberspace include: Internet magazines and newsletters, Usenet News, and mailing lists.

See pp. 86-87 for more about periodicals.

Another resource is Usenet News, which is a world-wide bulletin board system with discussion groups on various topics, including computer science, general science, social and cultural themes, recreational interests, etc. By sending questions to an appropriate newsgroup, you can receive answers from people experienced with solving your particular problem. Specific newsgroups to look for are those beginning with "comp," for "computer," and followed by the type of operating system, hardware, or software that you have a question about (e.g., **comp.os.unix** or **comp.os.msdos.apps**). To read about the culture and etiquette of Usenet News, read the group **news.announce.newusers**.

For training and support on more technical issues, check first with your provider. Other groups also offer formal classes and seminars, with the charge for these varying from no-cost to several hundred dollars for a one-day session.

Your local community may also have resources that can assist you. These are again colleges and universities, businesses, computer clubs and user groups, technology consultants, and government agencies.

▪ RFC Repositories:

Another way to get training and support is by accessing RFCs (Request for Comments). RFCs are online documents that deal with Internet-related issues, ranging from the basics of what the Internet is to highly technical aspects. In order to access RFCs, you must be familiar with FTP procedures. (See pages 51-54 for more information about FTP.)

Following is a list of hosts that are primary repositories for RFCs, and, for each host, the pathname to the directory that houses these files:

RFCs (Request for Comments) are documents that have been created by the Internet community in order to address general and technical Internet issues.

Host:	Pathname to directory:
ds.internic.net	rfc
nis.nsf.net	internet/documents/rfc
nisc.jvnc.net	rfc
venera.isi.edu	in-notes
wuarchive.wustl.edu	info/rfc
src.doc.ic.ac.uk	rfc
ftp.concert.net	/rfc

RFC names are in the file format you see in the "Suggested Reading" section, e.g., rfc####.txt, with #### representing the number of the RFC.

FYI (For Your Information) Notes are also RFCs; they are the subset of RFCs that are specifically geared toward new users. FYI Notes always correspond to an identical RFC version that is known by a different number. The important difference between FYIs and RFCs is that when an FYI gets updated, its number stays the same but the document changes, whereas when an RFC gets updated, the old document retains its number, but an additional updated document is created with a new number.

FYI documents are also RFCs, so the information about RFCs applies to FYIs as well. You can usually retrieve FYIs either by their RFC number or by their FYI number. FYI file names are in the format fyi##.txt, where ## is the number of the FYI.

There are two important differences between FYIs and RFCs, though: 1) FYI is the subset of RFC that is aimed at new users, and 2) when an FYI gets updated, its number stays the same but the document changes; when an RFC gets updated, the old document retains its number, but an additional updated document is created with a new number. (For example: when fyi4.txt, also known as rfc1325.txt, was updated, the update was made available as fyi4.txt and rfc1594.txt, and the old version could still be found as rfc1325.txt.)

Using the Internet Itself
As a Resource for Internet Training

If you would like more information about the Internet in general, about specific Internet tools, or even about technical Internet issues, then *the Internet itself* may be the best place to look. Through tools such as FTP, Gopher, and Usenet newsgroups, you can get useful information on the Internet (use of these tools is discussed in Section 2).

Here are some primary sources for online information about the Internet:

- **FAQs**
  (Files of Frequently Asked Questions about a topic, followed by answers.)
- **RFCs**
  (Request for Comment documents, which provide information on Internet-related topics.)
- **FYIs**
  (A subset of the RFC series, the FYI Notes are of particular interest to new users.)
- **Newsgroups for discussion of Internet-related topics**
  (Such as comp.infosystems.gopher.)
- **Keyword searches of documents available on the Internet**
  (Using search tools such as Archie and Veronica.)

Example source: Veronica FAQ

To find out more about the Internet tool called *Veronica*, you could read the Veronica FAQ file. The current version of this FAQ can be retrieved through the Gopher at **veronica.scs.unr.edu**, in the Veronica directory. What follows is the list of questions in this FAQ, which are answered one by one in the actual document.

Q1: What is Veronica?
Q2: How can I connect to Veronica?
Q3: So I get a list of titles; how can I get information about the location of items I'm interested in?
Q4: Why do I need to use 'item descriptor' to get context and host info?
Q5: How can I get my server into the Veronica database?
Q6: How can I keep my server out of the Veronica database?
Q7: How often is the database updated?
Q8: Where can I get the software to run Veronica?
Q9: Where can I get the Veronica dataset?
Q10: Why can't I get a reply from a Veronica server?
Q11: What does "Veronica" mean?
Q12: Why doesn't my server show up in Veronica searches?
Q13: Where are the Veronica server sites?
Q14: How do I compose Veronica search queries and use the Veronica options?

I've heard that there are files on the Internet that parents would not like their children to access. How can students be kept from accessing such objectionable material?

Schools need to exercise reasonable oversight while realizing that it is almost impossible to absolutely guarantee that students will not be exposed to objectionable material. If your school has an Internet connection, it is possible that everyone on the network, including students, is able to download files (FTP), some of which contain materials that just about anyone would consider objectionable for school-age children. Some options for connecting to the Internet do not support file download. Also, downloading could be prevented by assigning students passwords that only permit e-mail access. Yet even if students cannot download files, it is still possible for them to receive objectionable material through e-mail, or through some Gopher sites (as well as through Telnet and some other Internet tools).

The Internet, like any other communications medium, contains some material that is not appropriate for children. For this reason, it is important that schools develop clear policies regarding Internet use.

Another possibility is to control the times and opportunities that students have to access the Internet, and only allow access under supervision. In elementary schools, access for students may be more supervised than in the upper grades, or only specific Internet services may be available to the younger students.

Should we be concerned about untrustworthy people on the Internet who might have contact with our students?

The Internet is a powerful tool for facilitating communications among people around the world. Unfortunately, though, the Net is not limited to trustworthy people, and media attention has focused on problem incidents.

Students should exercise caution when meeting others online; instances can occur in which users are harrassed or taken advantage of. Here are some safety guidelines for students who are meeting other people online (via tools such as e-mail, chat forums, or interactive games):

- Never give out your address, telephone number, or school name.

- Never respond to any messages that are suggestive, obscene, or threatening. Show such messages to an adult/teacher (the adult can forward a copy to the service provider for investigation).

- Remember that people on the network may not be who they claim to be; for example, an adult could be masquerading as a child, or vice versa.

- Don't believe everything you read online, especially "special offers" that require you to send money.

How do we keep viruses from attacking our computers if we connect to the Internet?

If you use the Internet to exchange data (such as text or pictures), virus infection is generally not a problem. The real concern is when you download software programs and run them on your own computer. Any program you download over the network and run could have a virus. For that matter, any program, even commercial software still in its original packaging, could have a virus.

For this reason, all computers should have virus protection software installed – not only for checking downloaded Internet files and programs, but for any kinds of file transfers and disk movement of files that you perform on your computer.

Such virus protection software can be purchased for nominal cost at computer stores or via mail order, or may even come bundled with your operating system software (e.g., DOS 6.0). Virus protection software can also be downloaded from the Internet itself.

To further reduce the risk of downloading a virus with your program, try to use trusted sources. Ask someone you know or send the question to a mailing list or newsgroup to find the most reliable sites for software access.

How do we keep our own and other people's computers safe from "hackers" and "crackers"?

In the language of computer folks, a "hacker" is someone who is adept at understanding and manipulating computer systems. A "cracker" is someone who maliciously and/or illegally enters or attempts to enter someone else's computer system.

Computer security is unquestionably important, both in maintaining the security of the school's computers and in ensuring the proper behavior of your district or school's students. In this area, not only school policy, but also state and national laws may apply. One source of information that you can read to help you sort through security issues is "Ethical Uses of Information Technologies in Education," a publication of the U.S. Department of Justice. (The cost of this publication is $9.00, and you can order it by calling 800/851-3420.)

If you are a *site* on the Internet (that is, if remote computers can log on to your system), then permitting others access to your computer *is* a primary security issue. However, if your Internet connection only involves *access to other* computers, then "crackers" do not pose a security problem for you.

What are the rules for using the Internet?

When your Internet connection is first established, your network provider should acquaint you with its Acceptable Use Policy (AUP).

This policy explains the acceptable and unacceptable uses for your connection. For example, in all cases it is unacceptable to use the network for illegal purposes. In some cases, it may be unacceptable to use the network for commercial purposes. If such a policy is not mentioned, ask for it. All users are expected to know what the acceptable and unacceptable uses of their network are. Remember that it is essential to establish a school-wide policy in addition to the provider's AUP.

Network activities that might be ***prohibited*** *by an AUP policy include: using the network for an unlawful or illegal purpose, deliberately disrupting another person's work or system, sending chain letters, and using another person's password.*

What should we tell students about using the Internet ethically?

In order to encourage students to use this communication tool responsibly, schools should consider integrating issues around technology and ethics into the curriculum.

One issue of particular concern is the downloading of objectionable files, which was discussed on page 26. Also of concern is the way in which new users treat the host computers that they access. To help ensure that your users make appropriate use of other sites that are making resources available (for example, FTP and Gopher sites), new users must be taught to treat publicly available online systems with consideration and respect. This includes observing restrictions on access hours as well as the more serious problem of "cracking."

A third issue of concern is making users aware of the cost of the Internet connection. Depending on how your Internet connection is provided, you may be billed according to the amount of time you spend online per week or per month. New users should be made aware of the importance of using connection time sensibly and not running up costs.

Networks: Where Have You Been All My Life?[*]

By Chris, a ninth-grader in Maryland

Telecommunications networks have affected my life in many positive ways, and opened endless possibilities for me to explore. The first and most important way networks have helped me is with my school work. Before I was introduced to computers and networks, my textbooks, parents and teachers were my only sources of information. When I had a report or project to research, I was limited by the amount of information available in our small local library. My parents, teachers,and books are still my main resources, but they are no longer my sole source of information. Over the networks I can access information that is not available in our rural community. I can reach and search sources located throughout the world. Networks also allow me to access primary sources; such as actual newspaper articles, databases and even the people that wrote the textbooks, or taught my parents and my teachers. Telecommunications allow me to do all of this without even having to leave my room, or run up the phone bill.

The vast resources of just a few networks helped me last year in science when we worked on projects that needed up-to-date information. Our curriculum was based on recent earthquakes, hurricanes, and oil spills which required facts and numbers that couldn't be found in any textbook. For example, we didn't just look at a textbook diagram of what caused an earthquake, we used the networks to learn what happened to the people's lives and homes. Instead of just being given a set of directions and materials that would result in an earthquake resistant building we designed and tested them ourselves. We also had to design cities that were to be built where an earthquake was as bound to happen. We searched the National Earthquake Database for records of recent earthquakes and read articles published at the time. We learned to deal not just with the boring facts, numbers, and formulas which discourage most students from science but more with the everyday aspects of these situations.

Networks allow me to talk to whom ever I would like, anywhere in the world. Earlier last year one of my friends who helped me in science moved up to Alaska, and we really couldn't talk to each other because of the long distance phone bills. I decided to see if one of the local e-mail networks would be able to reach him. We finally got to talk to each other, through a network of e-mail. While the messages were being sent we both made a lot of friends, and have gotten into many interesting conversations. After wandering through a lot of small networks I decided that I wanted to see what was so great about this network called the Internet. It's absolutely fabulous! If you need to find out about anything the information is readily available, but you have to know what you're doing. If you don't know what you are doing you can be totally swamped with information that is irrelevant. There are listservs and newsgroups about every conceivable topic and people to discuss every area of interest.

The amount of information and human resources available through telecommunications networks can enhance the community, because networks promote good relations with other people and can provide the community with useful information. The 4-H and the Cooperative Extension Agency is asking members of the 4-H in our area to set up a bulletin board system that will be linked to the Internet. Setting up and operating this bulletin board is going to be one of my main 4-H projects for 1994. The 4-H bulletin board's purpose will be to help promote 4-H and to bring together 4-H'ers and their ideas. If this bulletin board generates enough interest, we will use it to exchange ideas and information with other communities about such things as recycling and composting.

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[*] *In January and February 1994 the National Center for Education Statistics, the NASA K-12 Internet Project, and the National Science Foundation jointly sponsored an essay contest open to all U.S. students from pre-kindergarten to twelfth grade. In their essays, entitled, "Networks: Where Have You Been All My Life?", students were asked to describe their most significant learning-related telecommunications experience. Several winning essays are scattered throughout this handbook.*

What are the benefits of using the Internet for classroom activities?

Teachers who use telecommunications tools in their classrooms were asked a similar question in a recent study. The top five incentives for conducting student learning activities, all of which rated an agreement score of 4.9 or higher out of a possible six, were the following: it opens up the world for students; students get information they couldn't otherwise get; it increases students' inquiry-based analytical skills; students gain familiarity with basic computer applications; and it allows students to feel successful. [2]

The results of the study also demonstrated that in order to ensure the success of an online project, several factors must be accounted for, such as advance planning, well defined project goals, a specific timeline (when participating in classroom exchange projects), and ongoing technical support. These factors are shown in the table below.

Educators' top five incentives for conducting online student learning activities:

- *Opens up the world for students*
- *Students get information they couldn't otherwise get*
- *Increases students' inquiry-based analytical skills*
- *Students gain familiarity with basic computer applications*
- *Allows students to feel successful*

Factors that Influence the Success of Online Student Learning Activities[2]

1= not at all important, 6=very important

Factors	Mean Ratings of Importance
Advance planning	5.3
Full cooperation of participating teachers	5.3
Well-defined project goals	5.2
Relevance of activity to curriculum	5.2
Specific timeline (classroom exchange projects)	5.0
Ongoing technical support	5.0
Preparation of students in use of telecommunications skills	4.5
Students having direct access to network	4.3
Teachers have previous experience	3.6

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[2] *Telecommunications and K-12 Educators: Findings from a National Survey.* Center for Children and Technology at Education Development Center, New York, NY. 1993.

How can I find specific projects that are currently on the Internet, schools willing to participate in projects, and colleagues who support networking?

There are several resources on the Internet that are directed specifically at the elementary and secondary school communities, and the number is growing. The InterNIC Gopher server has a section on K-12 education, the Consortium for School Networking maintains a Gopher server, and NASA's Spacelink is directed at elementary and secondary school educators. For access to these and other resources, see "Guide to K-12 Internet Resources," beginning on page 67.

Many people on electronic mailing lists such as Ednet, Kidsphere, and the Consortium for School Networking Discussion List post their projects and ask for partners and collaborators. The K12 hierarchy of Usenet newsgroups has several groups where educators post these invitations as well. For subscriptions to these and other electronic lists and for names of newsgroups, see "Guide to K-12 Internet Resources."

There are a number of associations that sponsor collaborative educational projects; for information on how to contact these associations, see p. 70.

RECENTLY SEEN ON THE KIDSPHERE MAILING LIST:

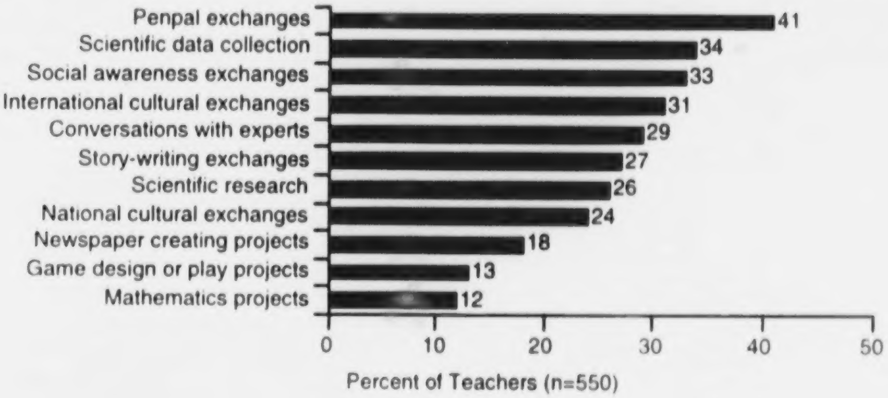
We are doing a project to measure u-v radiation levels in our area (Winnipeg, Canada). We would like to compare levels in different areas around the globe. If you would be willing to help out on our project that would be great. We would need the date of your reading, the time of day it was taken, the weather conditions and location (city, country).

For more information about the Kidsphere mailing list, see page 69.

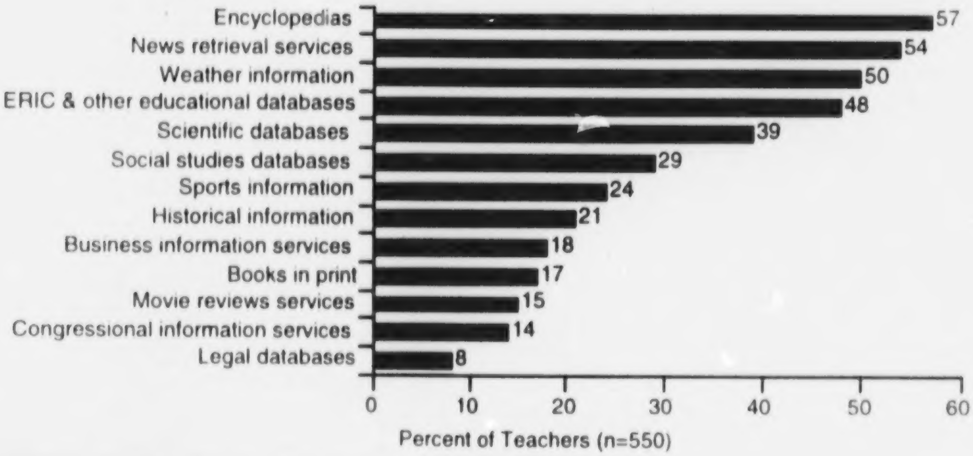
What are some examples of how the Internet is being used in classrooms now?

Some examples of how the Internet has been used in classrooms can be found in the section called "Examples of Educational Projects Using the Internet" (page 81). Also, teachers who actively use telecommunications were surveyed as to what specific kinds of classroom learning activities they conduct with telecommunications. Here are the results, ranked from most popular activities to least popular activities: [3]

Student Learning Activities: Classroom Exchange Projects



Student Learning Activities: Services and Databases



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[3] *Telecommunications and K-12 Educators: Findings from a National Survey.* Center for Children and Technology at Education Development Center, New York, NY: 1993.

Is there a manual that lists sites on the Internet particularly useful for educators?

The number of Internet sites is always growing. A list of many K-12 Internet sites has been compiled in the "Guide to K-12 Internet Resources" section (page 67), and you will quickly find others that speak directly to your own needs and interests.

Another source is the publication entitled "An Incomplete Guide to the Internet: Especially for K-12 Teachers and Students," compiled by the National Center for Supercomputing Applications (NCSA) Education Group. This publication is a well organized and extensive resource for education-related Internet sites. Resources are grouped according to subject area (for example, science and math, language arts, social studies, teaching and curriculum, computer software and networking). A thorough listing of resources about the Internet (access, address searches, and online Internet guides) is also provided. For information about ordering this guide, see page 85.

There is no such thing as a "complete" manual of Internet sites, because new sites appear every day, other sites drop away, and addresses change. You will encounter many new resources yourself as you explore the Internet. Also, by subscribing to an Internet magazine or newsletter, you can get up-to-date information on sites to access.

See the "Suggested Reading" section for a listing of some Internet periodicals.

How can I add my own contributions to the Internet?

At the network server operated by the Consortium for School Networking, as well as the server operated by PSGnet and RAINet, educators are encouraged to submit projects, lesson plans, and ideas. See "Guide to K-12 Internet Resources" for information on reaching CoSN or submitting materials, and for access to the server maintained by PSGnet and RAINet. It is important to remember that anything you create should be updated for others as you make changes yourself in the course of your learning by experience.

The electronic mail lists and newsgroups mentioned are also places to share your resources. You can participate in mailing list and newsgroup discussions by posting questions or comments; in this way, you will reach many other people who are interested in that particular topic – some of whom may respond to you or put your knowledge to use (excerpts from a recent mailing list discussion appear on the opposing page). As you gain experience, you may find you have the knowledge to put up an electronic server at your own site.

Some Excerpts from a Recent Discussion about Homework On the"K12ADMIN" Mailing List (subscription info on p. 69)

Parent in Ohio: As a parent, I would like homework and tests to be more than something to grade. What do students learn from having it handed back with a bunch of red lines drawn through the student's answer? My daughter's second grade teacher meets with the child and goes over every paper and then sends it home for correction and does give them credit for redoing.

Biology teacher in Virginia: That's wonderful that your daughter's second grade teacher does that, but how do you propose that high school teachers with a class load of 150+ do the same? I try to do many different types of informal evaluation, practice tests, etc. before the real thing. However, at some point it comes time to test what has been learned and assign the grade accordingly.

From a middle school in Alabama: I have been piloting a voice mail/homework hotline system this semester in our middle school and have been thrilled with the results. The system consists of a computer, phone card, software, and a telephone line. It is "simple" to setup and use and I have not had to touch it since January – it runs itself. Each teacher has a mailbox which can be called for listening to homework assignments; also, parents or students can leave messages for the teachers. I am delighted with this way to increase communication with parents.

Assistant principal in California: As educators we are most often bred from success in school ourselves. Very few teachers or administrators I know were not successful in school, and we often generalize our expectations about what the home environment of our students looks like to reflect what our own experiences were. I have a problem with a system that has the same home expectations of every child, without acceptance of the vastly different environments of every child. There are students at my school who turn in every assignment, and it's no big deal to them, tutors or parents have helped or even done the work for them. There are other students who have overcome abyssmal home environments to get 50% of their homework done. Who is the better student?

Physics instructor in South Carolina: I can empathize with your comments about the kids' home environments, but what we will never have is equity in home environments. Sure some kids will succeed although they came from just the opposite environments, but I have to question whether the school can or should intervene in the home life of kids or make exceptions to policies based on the kids' backgrounds. This just leads to the relaxation of standards, which is exactly what the kids from impoverished backgrounds do not need.

High school teacher in Texas: In our secondary school, which has almost 4,000 students, we give a grade of 50 for an assignment that is one day late, and a phone call is made to the parent to notify them immediately. (All work turned in thereafter receives a grade of zero.) The phone call is really very effective. Since it is district policy, nobody tried to "wear down" the teacher with excuses. The kids are used to this policy by the time they get to high school. Teachers are given a telephone log sheet – each parent call must be logged and the sheet is turned in at the end of the year along with your gradebook. I viewed this as a pain my first year, but I saw it work and I saw it back teachers up when a negligent parent would plead ignorance.

District administrator in British Columbia, Canada: If kids really do learn at different rates, then that means that learning should not be dependent on time. Kids should take as long or as short a time as they need to learn whatever it is they are trying to learn. We assign the same homework to every kid in our class, give them all the same deadline, mark them all on the same set of criteria, and then move on, whether the kid has learned anything or not. We even have the nerve to give all these different human beings a zero if they don't meet our standards of time conformity.

Section Two

Accessing Internet Resources

The best way to learn about what the Internet has to offer is to get Internet access, log on, and explore what's out there, with some handy tips by your side. This section will assist you in the beginning stages of your exploration and will also serve as a reference for some basic Internet commands. Even if you have not yet acquired Internet access, you may find it useful to browse through this section, in order to get an idea of what resources are available.

If you have full Internet access, there are many kinds of services available to you, with new services being offered whenever someone thinks of a novel way to use the network. Each one of the major Internet services that is currently available is described in this section, in order to give you an idea of exactly what the Internet has to offer. Often, useful commands are included; many commands are also listed on the Quick Reference Sheet for Commands (the final page of this document). In many cases, however, you will need to consult with your network provider about commands used on their system, as well as about the specifications and limitations of your Internet access.

Once you gain some experience on the Internet, it is advisable that you read more in depth about the various Internet services. Consult one of the recent books on the Internet (check a bookstore, or look at the titles in the "Suggested Reading" section). This section is a source for basic information on Internet tools and does not address their more advanced features.

A Brief Overview of Internet Services

COMMUNICATION TOOLS

E-mail:	Send electronic mail to anyone with an e-mail address; usually mail is delivered *within minutes* to anywhere around the globe.
Newsgroups:	Chat with other users about hobbies, computer questions, or any topic ranging from the bizarre to the practical. There are thousands of newsgroups, all organized according to topic.
Mailing Lists:	Take part in or follow the discussion about a topic of special interest to you. Mailing lists are similar to newsgroups; however, the mailing list discussion takes place *via e-mail*, whereas a newsgroup discussion does not. Also, mailing list discussions tend to be smaller, more focused, and more formal.
Talk:	Have a real-time conversation with another Internet user who is logged in.
IRC:	Join a real-time discussion among Internet users around the world.

TOOLS FOR ACCESSING ONLINE INFORMATION

Telnet:	Log in to a remote computer and explore what they have made available on their system – such as library catalogs, weather forecasts, or newsletters.
FTP:	Bring files from a remote computer to your computer (called "downloading"), or send your own files to a remote computer ("uploading").
Archie:	Search the Internet for files that you can download via FTP. Archie will provide the address where the file is stored; then you can follow FTP procedures to get the files.
Gopher:	Visit a user-friendly, menu-driven reservoir of resources set up by an organization such as a college or a government agency. Once you're there, you'll have access to any kinds of resources that that particular organization thought would be of interest to its users (for example, files, e-mail directories, and Telnet sites).
Veronica:	Search all the Gophers around the world for menu items containing key words.

OTHER INTERNET SEARCH TOOLS

WAIS:	Have access to many different types of databases and files by logging on to one computer; you can search the contents of documents for particular words.
WWW:	Search documents, databases, etc., using hypertext (a method that links words and documents to other information). To get more information about a subject or word, you can usually just "click on it" to read in greater detail.
White Pages:	Use various White Pages directories on Internet to search for e-mail addresses.

Communication Tools

Internet access gives you the capability to communicate with other Internet users almost instantaneously, by sending electronic mail or typing messages back and forth in real time. Communication tools include e-mail, newsgroups, mailing lists, the Talk program, and IRC (Internet Relay Chat).

E-mail

E-mail (electronic mail) is like postal mail, in that it allows you to exchange messages with people or services. However, e-mail is delivered through a computer network to your computer mailbox, and the transmission of a message is much quicker (usually only a few minutes at most, and sometimes seconds). Internet users, having become spoiled by the immediacy of e-mail, often refer to postal mail as "snail mail."

Smileys: Expressive E-mail

In electronic mail messages, it is sometimes useful to indicate that something is meant in jest, or simply to communicate emotion which typed words cannot convey. A collection of smiley faces has evolved to meet this need. Turn your head sideways to the left to view these smileys:

:-)	smile
:-(	frown
;-)	wink
:-D	laughing
8-)	wide-eyed
:-}	grin
:-X	close-mouthed
:-]	smirk
:-O	oh, no!

Internet addresses may seem confusing at first, but they all follow the same simple structure: a user's log-in name (also known as "userid" – pronounced "user-eye-dee"), followed by the "@" sign, followed by the name of the host computer on which the user has an account. Your address will be assigned to you by your system administrator or network provider. The address is expressed in a string of *domains* which are separated by periods; domains often provide information about where the user has an account. For example, the final domain in a string is often one of the following:

com	Commercial institution
edu	Educational institution
gov	Government site
net	Gateway and other network host
mil	Military site
org	Anything that doesn't fit easily elsewhere, such as professional societies

Each individual country also has its own domain, such as "ca" for Canada and "fr" for France.

Please note that while domains *within* an e-mail address are separated by periods, e-mail addresses never end with periods. (The same is true of addresses for Internet sites, such as Gopher and Telnet sites.)

To use e-mail, you must also have use of a mail software program that is made available by your access provider. Two common mail programs are called "pine" and "elm." When you begin to compose a message, you will be prompted for the Internet address of the person or organization you want to contact (mail software packages typically allow you to store an "address book" of frequently used addresses), as well as the subject of your message. Depending on how your mail software package is set up, you may also be prompted to enter information such as keywords or attachments. You are not prompted for your e-mail address, nor for the date and time of your message – the mail program automatically attaches them.

A Sample E-Mail Message

To: gfitz@cerf.net
From: ers@access.digex.net
Subject: Alternative Energy Projects

-----Message Text-----

We have read about the Global Schoolhouse Internet projects, which connect students worldwide. We are particularly interested in projects relating to alternative energy sources. Could you send some information about any recent Global Schoolhouse projects involving that topic? Thanks!

Educational Research Service

Mail software programs vary; the e-mail you send may look somewhat different.

You do not need to be logged on to receive e-mail. If you are connecting through a service provider, the mail will be received and stored there for you until you turn on your computer, log on to the Internet, and either delete or move the mail.

If you prefer, you can compose your message in your word processing program before sending it as e-mail. After you have saved the word-processed document as **text**, upload it to your machine by following instructions given by your communications package, and/or your network provider. Next, open your mail program, begin a new message and insert the file, using the name it was given once it was uploaded. (Refer to your network provider's instructions about inserting files.) This procedure should work on most systems.

▪ E-Mail Etiquette

Here are some tips for sending e-mail:

- Give your message a meaningful, but *brief*, subject line.
- Don't type in all capital letters. In the world of e-mail, this is akin to shouting at someone, plus it makes the message more difficult to read.
- Consider the way that the message may come across to others – often, sarcasm and joking can be misinterpreted. Use smileys to convey joking

- When you respond to a message, include the relevant parts of the original in your reply.
- Sign your name. Your mail program will attach your address anyway, but signing off is a good habit to get into.
- Be brief in your message, and don't include a long "signature" file at the end. Signature files, which are appended to a message to provide information about the sender and his/her organization, should be kept to four lines in length.
- Proofread your mail before you send it.

Sending E-mail Between Services

You can exchange e-mail between the Internet and most major services. Here's how:

Service	Address for sending mail from Internet to service	Address for sending mail from service to Internet
America Online	*user*@aol.com	simply the Internet address
CompuServe	*CompuServe ID number*@compuserve.com Change the comma in the ID to a period.	INTERNET:*Internet address*
MCI Mail	*MCI Mail ID number*@mcimail.com Delete the comma from the MCI Mail ID.	At the "To:" prompt, type recipient's name At the "EMS" prompt, type the word "Internet" At "MBX" prompt, type the *Internet address*
GEnie	*user*@genie.geis.com	*Internet address*@inet#
Prodigy	*Prodigy user ID*@prodigy.com	simply the Internet address (Currently only DOS-based users have the ability to send mail.)
Applelink	*user*@applelink.apple.com	*Internet address*@internet#

For an extensive guide to inter-network addressing, download the "Inter-Network Mail Guide" by anonymous FTP from ftp.csd.uwm.edu. The file is in the pub directory.

Networks: Where Have You Been All My Life?*

By Marcus, a first-grader in Maryland
(Dictated)

Hi my name is Marcus. I'm 6. I like computers. I have a friend in Tasmania; his name is Glenn and he wrote to me. I know where that is on the map. It is far far away. I can see on the map on the screen. It is dark on the screen where Glenn is but it is light where America is.That's because Glenn is sleepy and I am in school. Tasmania is on the bottom of the world! The water might be falling because it is in the bottom. Glenn is not is school right now because it is summer and he's asleep right now anyway. We are having winter and it is cold here but not where Glenn lives. I see his picture on my wall by the map of the whole big world. His teacher sent it to us. He has dark brown hair and he wrote to me and it is fun.

I have another friend in England called Billy but I don't have his picture. He told us that he likes his mummy and daddy and Merwin. He likes swimming picnics and riding horses. I never rode a horse. But I like to swim. I never went on a picnic.

I have a big friend in Finland who talked to me on the computer one day. His words came on the screen. I saw them coming fast. I told him that I can count up to 10...now I can almost count to 100! My friend is Mikael and he gave me his numbers in his language. We are writing big sentences today and we are almost off the screen! My teacher gave me a copy of how to count up to ten in Finland.

I was in the newspaper because I was typing to Glenn on the computer. My messages go to Glenn and Billy and Mikael through that thing over there called a modem. The lights blink when we do this. It goes to the big network like a post office through the telephone wires. My letters get there fast.

There's a Rudolf and a snowman on our computer that blinks. I like it. It is real pretty. Our friend, Meike, in The Netherlands sent them to us. She made a picture. How did she do that? Our friend, Olya, in Russia sent us her picture through the wires and she and her brother are there but the picture is on its side! Olya sent us a little tune about a fur tree that their Russian children put in their house at New Year's. Do you want to hear it?

I feel good when I come to the computer room and I play with numbers and stories and write to my friends. I come every day. I wish I had a computer at home. This helps me in school because it gets my mind better because you are reading and reading and that's good. I learn about other countries and maps and what time it is.

* *In January and February 1994 the National Center for Education Statistics, the NASA K-12 Internet Project, and the National Science Foundation jointly sponsored an essay contest open to all U.S. students from pre-kindergarten to twelfth grade. In their essays, entitled, "Networks: Where Have You Been All My Life?", students were asked to describe their most significant learning-related telecommunications experience. Several winning essays are scattered throughout this handbook.*

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Usenet Newsgroups

Usenet (also known as Network News) is a collection of thousands of topically organized, chatty "newsgroups." The name "newsgroups" is deceptive, because these groups are not mainly concerned with news, but rather with many topics of special interest. The tone of Usenet tends to be casual, and the discussion is usually loosely structured. Usenet is accessible through a newsreader software program that is made available by your network provider. It is also possible to access Usenet through some Gopher sites and BBSs.

The newsreader acts as an interface: you tell it which articles you want to read, and it presents them to you, keeping track of which articles are read and unread. Groups are organized hierarchically, according to concentration. Here are the major categories:

alt	alternative discussions; not carried by all sites
bionet	biology
bit	discussions that originate from Bitnet listserv mailing lists
biz	business; commercial articles are only permitted here
comp	computer topics and information
k12	issues related to K-12 students and teachers
misc	miscellaneous
sci	relating to science
soc	social issues; includes discussions about many different world cultures
talk	debate-oriented groups
news	about the news network itself, group maintenance, and software
rec	hobbies, recreation, the arts

Reading Usenet articles does not require downloading or storing files, but simply accessing groups that are carried by your local site. Most sites do not offer all newsgroups.

SOME USENET JARGON

FAQ: Refers either to a frequently asked question or, more commonly, to a *file* of frequently asked questions about a topic, followed by answers.

Flame: A post to a newsgroup (or an e-mail message) that is particularly hostile or goes on at lengths about an absurd topic.

Netiquette: Network etiquette; see next page for some netiquette guidelines.

Lurker: Someone who reads and follows the discussion but does not contribute.

Newbie: Someone new to the Internet; newbies are encouraged to lurk before they post.

Sig: A block of text, usually no more than four lines in length, that is appended to a message. A sig often acts as a business card, providing information about the person and/or their organization.

Where else but Usenet would you find people talking about topics as diverse as hardware for Macintosh computers (**comp.sys.mac.hardware**), Romanian culture and society (**soc.culture.romanian**), the meaning of dreams (**alt.dreams**), and scuba diving (**rec.scuba**)?

▪ Some "Netiquette" Suggestions:

- Don't post an article of your own until you've become familiar with the customs of Usenet. Reading a newsgroup for a few weeks before posting can give you an idea of what questions are welcome on that particular group.
- Usenet newsgroups usually have a FAQ (Frequently Asked Questions) posting – read this before you ask questions that might already be answered there. Many FAQs are posted to the newsgroup **news.answers**.
- It's a good idea to include a "sig" that lets other users know how to contact you and what organization you are affiliated with. Generally, you should keep your sig to four lines long or less – extremely long sigs with elaborate graphics or quotes are distracting to other users.
- If you are responding to someone else's posting, include enough of their original post to provide a context for your response. Remember, however, to edit out any parts of their message that are not directly related to your response. (See your newsreader's help documentation for information on how to do this.)
- Keep in mind when you send a message to Usenet that your message may be read by hundreds of thousands of people.

Common Acronyms Seen in Usenet Posts

BTW	*by the way*
CU	*see you (goodbye)*
IMHO	*in my humble opinion*
LOL	*laughing out loud*
ROTFL	*rolling on the floor laughing*

Mailing Lists

A mailing list is a forum for people who are interested in discussing a particular topic. Messages sent by people on the discussion list are distributed to the mailboxes of all individuals who subscribe.

Many mailing lists are maintained by a *listserv* program that acts as a mass mailing system, doing most of the dull repetitive work that people do in mail rooms. You tell the listserv which mailing lists are of interest to you, and the listserv sends you the messages of the discussion.

Mailing lists are similar to Usenet in that they act as discussion forums. However, there are two important ways in which mailing lists differ from Usenet:

- In order to participate in Usenet, you need to learn more – in particular, how to use a newsreader program. It may take you a while to feel comfortable with your program. With a mailing list, you only need to learn how to send and read mail, because discussions occur via e-mail.

- The discussion of a mailing list comes to you in the form of messages sent to your electronic mailbox. Mailing lists vary in mail volume – some deliver only a few messages per month, whereas others deliver hundreds every day. Usenet articles, in contrast, are stored on your access provider's end for use by all clients (not in your personal mailbox). This difference also means that the mailing list group is much smaller and more focused than a Usenet discussion group. Mailing list discussions are often more formal and less chatty than newsgroup conversations as well.

If you subscribe to a mailing list and if you have a *direct* connection to the Internet, the messages are all sent to your computer. However, if you are connected to the Internet through a service provider, the files are stored on the provider's computer until you remove them. They are in your personal space on the provider's computer, and you may be charged for the storage they require. Since these messages do take up space – whether on your own or a provider's computer – you must frequently and routinely delete unnecessary files. You can make mail management easier by requesting that a mailing list to which you subscribe periodically sends the messages as a single file, or *digest* – instead of as many separate files. (See page 47 for a summary of mailing list commands.)

A mailing list may be moderated; that is, messages sent to the list are actually sent to a moderator who determines whether or not to send the messages on to everyone else.

Mailing list messages also exist as *archived* files that can be downloaded via FTP or accessed via tools such as Gopher. Archives frequently have the filename format of *listname logYYMM*, where *YY* is a year and *MM* is a month. To get a mailing list's archives for a particular month, send e-mail to the administrative list with the message **get *listname logYYMM*.** For example, to get the KIDCAFE discussion from October 1992, send e-mail to **listserv@vm1.nodak.edu** with the message: **get KIDCAFE log9210**

Another place to access archives is through Gopher. (See the Gopher section, beginning on p. 56, for information about Gopher and Veronica.) Access a Gopher site that allows you to do Veronica searches, such as the Gopher at the University of Minnesota (**gopher2.tc.umn.edu**). Enter the list name as a key word in your search, and the results of your search will tell you which Gopher sites carry those particular archives.

To subscribe to a mailing list, all you have to do is send an e-mail message. If the list is administered by a program such as listserv, you send the message to that program; if the list is administered by a person, you send a message to that person. It is

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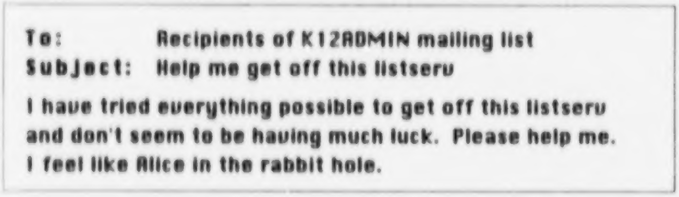
DON'T LET THIS BE YOU:



To: Recipients of K12ADMIN mailing list
Subject: Help me get off this listserv

I have tried everything possible to get off this listserv and don't seem to be having much luck. Please help me. I feel like Alice in the rabbit hole.

Mailing lists typically have two addresses: one for messages to the list administrator, another for messages to the list subscribers. If you want to subscribe to a list, unsubscribe from a list,or perform other official business, you should send a message to the administrator's address (also known as the subscription address) – not to the other subscribers, as illustrated by the e-mail message above. Messages addressed to the participation address should only deal with the discussion topic itself.

relatively easy to tell whether a list is listserv-administered or not. The description may tell you to send a message to a particular listserv, or the address for subscribing may begin with the word "listserv." Also, the description may tell you that it is a Bitnet mailing list – and nearly all Bitnet mailing lists use listserv.

Because listserv is an automated program, requests sent to this program must be worded in a specific format. For example, if you wished to subscribe to the mailing list KIDCAFE, which provides a forum for children around the world ages 10-15, then you would send an e-mail message to **listserv@vm1.nodak.edu**, and in the body of the message you would type:

> **subscribe KIDCAFE *your name***
> (where *your name* is your full name – not your Internet address)

Other useful listserv commands are included in the side bar.

If the mailing list to which you wish to send a message is *not* a listserv, then follow any instructions given to you as to how to word requests; if you aren't sure how requests should be worded, try using the wording for listserv requests. You can generally subscribe to these lists by sending a mail message to: "*listname*-REQUEST@*host*" and in the body of the message enter a request to subscribe. To send messages to other subscribers, you will then use the address "*listname@host*."

USEFUL LISTSERV COMMANDS

Use these commands when sending e-mail to the subscription address of a particular listserv. (Listserv subscription addresses begin with the word "listserv.")

help	send summary of basic commands
info ?	send list of information topics
info *topic*	send information about specified topic
list global	send summary of all Bitnet mailing lists
review *list*	send information about specified list
subscribe *list your name*	subscribe to specified mailing list
set *list* digest	receive one daily bundle of mail from a list
set *list* nomail	stop receiving mail temporarily
set *list* mail	receive mail again
unsubscribe *list*	leave the list permanently
signoff	same as *unsubscribe*

Networks: Where Have You Been All My Life?*

By Lucia, an eighth-grader in Massachusetts

I'm a citizen of Cyberion City, a space station on MicroMUSE. "MUSE?" You might ask. A MUSE is a network on the Internet -- a text-based virtual world where you can build and explore rooms, objects, all sorts of places and meet interesting people from all around the world. MUSE was developed out of the early computer games where you would walk around from "room" to "room," getting descriptions of everything as you went and interacting with the things you found. The difference between these and MUSEs is that on MUSEs the object is not to go kill the monsters and find the treasure, but rather to interact with other people and things, and create your own places using the object-oriented programming language that is a part of MUSE, learning as you go.

Since our own MUSE was set up at my school last winter I have really gotten into MUSE and learned more from and about it than I thought was possible from a computer "game". One of the things I value most about MUSE is the diversity of the people I've met. I have found many people there to talk to whom I would never run into in real life, people who share my interests, and many of whom don't know my age. Some are from other countries, some are much older than me, some are younger, some aren't comfortable communicating in real life, so they resort to virtual reality for their real friendships. On MUSE, I can be anyone I want, anything I can imagine. And people will accept me as that, because that is who I am on MUSE.

There was one project I was working on a while ago -- an intercom system-- solely for the purpose of learning to program better. Now I am in the process of building a farm from "The Belgariad" by David Eddings. People can walk through it, pick things up, and interact with the characters there. Through this project I have learned a lot about MUSE code, probably most of what I know. I am experimenting with zones and with objects that affect each other, having great fun with it, as well as making a place for other people to explore.

MUSE encourages users to learn on their own. Although you can learn a lot by being taught about MUSE, it is also important to do some exploration and figure some things out for yourself. You are forced to learn how to use the help system and understand what it means, but sometimes even that won't solve a problem. So you've got to figure it out some other way. It's great creative problem-solving practice for real life, when there may not be anyone around to show you how to solve a problem, or maybe even no one who knows how to solve it -- you've just got to do it yourself. But there are always other people logged on, so if you're really at a dead end you can ask one of them. Most people are very willing to help, and by helping, they also get a better understanding of what they are explaining to you, and of how to make things clear in general.

MUSE has changed my life a lot. Now I have many more friends with similar interests, people who I can talk to, test my ideas on, argue with. That's another thing. I LOVE to argue. By arguing, I find new ways to express myself, to prove my point, to prove to myself that my point is actually valid, and even if it's not, to figure out how I can convince whoever I'm arguing with that it is. On MUSE, I do this all the time. All in all, I think MUSE is great. I've been on for nearly a year now,and I plan to be on for many more.

* *In January and February 1994 the National Center for Education Statistics, the NASA K-12 Internet Project, and the National Science Foundation jointly sponsored an essay contest open to all U.S. students from pre-kindergarten to twelfth grade. In their essays, entitled, "Networks: Where Have You Been All My Life?", students were asked to describe their most significant learning-related telecommunications experience. Several winning essays are scattered throughout this handbook.*

Talk Program

With the *talk program* you can connect your computer to someone else's computer, and then type messages back and forth. This program provides live discussion with people from around the world.

Typically, you can start a conversation by typing **talk** followed by the Internet address of the person with whom you would like to talk. If the person you want to reach is logged in, they will receive a message that you are trying to reach them; to start the talk connection, they need only follow the instructions given to them.

IRC (Internet Relay Chat)

The *Internet Relay Chat (IRC)* service provides real-time communications among Internet users throughout the world. IRC consists of a number of channels, each with a particular topic of discussion. The discussion is an informal stream of messages. A lot of the chatting on IRC is just gossip – and some conversations may be objectionable for school-aged children. However, several curriculum projects have used structured and supervised IRC sessions as a tool for linking together classrooms in different parts of the world and creating international student dialog.

IRC sessions are typically begun by typing **irc** at the system prompt.

Tools for Accessing Online Information

Besides allowing you to communicate with other users, your Internet connection is a gateway to accessing information (files, databases, etc.) that other people have made publicly available on their computer systems. To reach the computers that have made their information available on the Net, you need to use tools such as Telnet, FTP, and Gopher. Other tools have been developed to help you search quickly for the information you need: Archie searches FTP sites, and Veronica searches Gopher sites.

Telnet

Telnet allows you to log on to a remote computer, as if your own terminal were directly attached to it. You can telnet to a computer on the other side of the room, or to one on the other side of the world – the only difference is that the distant one may be slower. (In the world of the Internet, distance is not associated with cost. You can telnet (or gopher, e-mail, etc.) to Australia as inexpensively as to an Internet site in your own community.) Services you can access through Telnet include library catalogs, databases, bulletin boards, and directories of e-mail addresses.

- **How to telnet:**

To begin your Telnet session, simply return to your provider's system prompt and type **telnet** followed by the address of the remote computer, and then hit return. Once you have reached the site, follow the instructions given to you on your computer screen for exploring the remote computer.

Make sure you note what the command is to quit your Telnet session with that particular host. If you're not sure, try this common escape command: Control key and right bracket key (]) simultaneously. Once you've quit the Telnet session and are at the **telnet>** prompt, type **quit** to return to the provider's system prompt.

The Telnet system is a friendly one; many of these remote hosts will allow you to have access to their computers without restriction. Others will require that you register, but don't ask you to pay anything (they may keep names of users for their records).

From another perspective, however, many Telnet sites are not so user-friendly. You may actually be connected to a computer running Unix software – an environment that uses commands similar to, but not exactly the same as, DOS. This can be confusing, particularly to Macintosh users or those who work primarily in a Windows-type interface.

Some Telnet sites have a number at the end of their address, such as the "Weather Underground" site: **madlab.sprl.umich.edu 3000**. "3000" refers to the *port number* of this site. Some Telnet addresses that you discover may specify a port number – they may tell you, for example, that their site is on "port #185." This simply means that at the end of the Telnet command, you should enter a space followed by the number 185.

▪ BBSs (Bulletin Boards)

A BBS (electronic bulletin board system) consists of a computer and associated software, which typically provides electronic messaging services, archives of files, and any other services or activities of interest to the bulletin board system operator, or "sysop." Although BBSs have traditionally been the domain of hobbyists, an increasing number of BBSs are connected directly to the Internet, and are accessible by Telnet. Most BBSs are also reachable by telephone (that is, by directly dialing the telephone number with a modem that is hooked up to a computer).

FTP (File Transfer Protocol)

File Transfer Protocol (FTP) is the procedure used to to transfer files between computers that are on the Internet. By using FTP, you can bring all kinds of publicly accessible files to your own computer. Files you can download to your computer include computer software, documents such as electronic books and journals, graphics, and data.

There are two kinds of FTP: full privilege FTP (copying files from a host with which you have an account) and the more common anonymous FTP (downloading files that have been generously provided by another computer to the Internet community). The main difference between these two types of FTP is that full privilege FTP requires a unique userid and password, whereas anonymous FTP does not.

Anonymous FTP sites allow you to log in without having to establish a special account with a unique password. Once you access these sites, you can download publicly accessible files to your computer. Anonymous FTP prompts you for a username and password – typically, the word "anonymous" is accepted as a username, and your e-mail address is accepted as a password.

There are many K-12 Internet resources listed in "Suggested Reading" and "Guide to K-12 Internet Resources" that can be obtained via anonymous FTP.

In most cases, when you see a reference to a file available for FTP, the reference will give you both a computer hostname and a pathname. So, for example, the ASCII text version of the EARN Resource Tool Guide is on the *host computer* **naic.nasa.gov** in the **/files/general_info** *directory (folder)* in the **earn-resource-tool-guide.txt** *file*.

Many online files are mirrored on more than one host. For example, RFC files ("Request for Comments" documents which provide information on the nuts and bolts of the Internet) are so popular that several hosts act as repositories for them; so, when they are cited, rarely is a hostname given. To find out all about getting RFCs, send a message to **rfc-info@isi.edu** and in the body of the message, type **help: ways_to_get_rfcs**. RFCs are available both via electronic mail and via anonymous FTP, as well as via many Gophers.

Once you establish that you have FTP access, a series of commands must be typed in to reach the host computer with the file you want, connect to the appropriate directory, and have the file transferred to your computer. A typical FTP session is described here, but not all software is exactly alike. If you have problems, check your software's documentation or contact your local provider's help-desk.

▪ How to Download Via Anonymous FTP:

This exercise uses an example file to be downloaded: a U.S. government document prepared by the EARN Association, called "EARN Guide to Network Resource Tools," which has the file name **earn-resource-tools.txt** and is stored in the directory **files/general_info** at the site **naic.nasa.gov**.

Many FTP directories and files (such as the ***general_info*** *directory mentioned to the right) contain underline characters within their names. This is because directory and file names are required to be one string of characters. The underline character must be* *included* *when you type in the address.*

1. Tell your computer what host you are trying to reach by typing **ftp naic.nasa.gov**
2. Log in to the remote computer you have reached with the username **anonymous**. You will be prompted for a password; most often it is preferred that you use your complete e-mail address as your password.
3. Navigate through the directory to find the file you need. Two useful commands for doing so are the one to change directories ('cd'), which you can use to step through more than one directory at a time: **cd files/general_info**, and the command that shows you the files and subdirectories within a directory: **dir**
4. Give a command to have the file sent to your computer: **get earn-resource-tools.txt**
5. Quit FTP: **quit**

USEFUL FTP COMMANDS

cd	*change directory*
cdup	*go to parent directory*
get	*transfer a file*
mget	*transfer multiple files*
dir	*list directory of files, with byte sizes*
ls	*list files*
pwd	*print working directory (prints current directory name to screen)*
bye	*quit*

Depending on how you connect to the Internet, FTP may be a slightly more complicated process for you. If you have Internet access through a network provider, the five steps listed above will bring the file to your provider, and you must then check the manual that accompanied your communications package, as well as your provider's manual, in order to transfer it to your computer.

Some FTP sites have the word "ftp" as part of their address, such as the NCSA site listed in "Suggested Reading." Its FTP address is **ftp.ncsa.uiuc.edu**. To reach this site, type: **ftp ftp.ncsa.uiuc.edu**

When you log in to an anonymous FTP site, pay attention to restrictions on access times; many sites do not permit access during business hours.

Downloading Software via Anonymous FTP

The Internet contains a great deal of publicly available software, which you can retrieve via anonymous FTP.

Sample downloading session: Downloading a program at the anonymous FTP site **handicap.shel.isc-br.com**, which is a site for disabilities information and software.

Once you have reached the FTP site (by typing **ftp handicap.shel.isc-br.com**), you can find out what different programs and files are stored there by retrieving the index (type **get index**). Exit FTP by typing **bye** and open this index file. Pick which programs or files are of interest to you – the index contains many types of files, such as information on seizures, programs for the visually impaired such as print enlargers, and IBM's Disability Resource Database.

As an example, let's say we pick a software program called "KeyCache" (filename keycac01.zip) from the index and decide to download it. This program is of special interest to the mobility impaired. It offers word prediction: when it is used with a word processor, typing out the first letter or first few letters of a word will bring up a choice of possible words; the options are determined by your past usage of words.

We notice that the filename ends in the extension "zip," which means that it is a compressed file and needs to be decompressed with a program called PKUNZIP. PKUNZIP is available from this FTP site in the pub/general directory, if you do not already have the program.

There is one thing you should know when retrieving files ending in the extensions "exe" (such as pkunzip.exe) or "zip" (such as keycac01.zip): you need to type the word "binary" followed by a return before you get files such as these. To get the files, first go to the directory in which they are stored by typing **cd** followed by the directory path; next get the file by typing **get** followed by the filename.

When you put these files onto your system, it is best to download them to a floppy disk first. "Exe" files in particular may contain viruses, and checking these files on your floppy disk before putting them on your hard drive will protect your computer from viruses.

Once you have put these files onto your system, you will need to unzip KeyCache. Exit your communications package and return to *your computer's system prompt.* You can decompress KeyCache by typing **pkunzip** followed by the filename (keycac01.zip). This will turn KeyCache into a self-running file.

Archie: The FTP Searcher

One problem with anonymous FTP is that in order to get a file, you need to know what machine it is stored on and where it is held in that machine's file system. *Archie* was developed to help overcome this problem. If you know the name of a file but do not know the address of the FTP site where it is located, or if you want to search the Internet for some files about a particular subject, then one of the several Archie servers available can help you find what you are looking for. Archie maintains a constantly updated catalog of many resources available through FTP; it currently keeps track of more than 2 million files. Archie can conduct three basic kinds of searches:

1. Searches for a file or directory with a certain name or a certain set of characters
2. Searches for files that relate to a certain topic
3. Searches for FTP hosts monitored by Archie: what they are, where they are, and what files are contained by a particular FTP host

You can connect to Archie in a variety of ways: by e-mail requests to remote Archie servers, by using Telnet to reach remote Archie servers, or by using Gopher. To try the Telnet interface to Archie you can telnet to an Archie server (preferably the one nearest you, and during non-peak hours). Log in as **archie** (no password is required).

Once in Archie, you can search for a word or string of letters by typing **prog** followed by the keywords. To search for files about a certain topic, type **whatis** (one string of characters, no spaces) followed by a space and the keywords. (For a summary of Archie commands, see the box above.) The results of Archie's search tell you: 1) at which host your desired information is located and 2) what the directory path is to the place where the file is stored. Write these down *exactly* as they appear on your screen.

Once Archie has given you the information as to where the file is stored, follow FTP procedures to download the file.

USEFUL ARCHIE COMMANDS

prog *keywords*
searches for keywords

whatis *keywords*
searches for files with the keywords as a topic

set search exact
searches for the exact words entered (case sensitive)

set search sub
searches to match substring anywhere in the filename (case insensitive)

set maxhits *number*
tells Archie the maximum number of items you want to find. When Archie reaches this number, it will stop searching.

set sortby time
results of the search will be displayed from newest to oldest

ARCHIE SERVERS

Site	Location
Archie.unl.edu	USA (NE)
Archie.internic.net*	USA (NJ)
Archie.rutgers.edu*	USA (NJ)
Archie.ans.net	USA (NY)
Archie.sura.net*	USA (MD)
Archie.uqam.ca*	Canada

Sites marked with an asterisk run Archie Version 3.0

Gopher

A relatively new method of viewing and retrieving information is the *Gopher* system. As the Internet developed, many users ran into the problem of not being able to find the information they needed, because the wealth of information available was scattered across the Internet. The Gopher system was created by programmers at the University of Minnesota to meet the demands of Internet users and providers for a more efficient, user-friendly way to locate resources. A Gopher site provides accessibility to different kinds of services through a system that looks like a series of menus to the user.

WHY IS IT CALLED "GOPHER?"

The word "gopher" is a pun on "go fer" – referring to the way that a Gopher goes for your files. Also, the mascot of the University of Minnesota (where this tool was developed) is a gopher.

A Gopher site gives you access to resources such as electronic texts and files that you could access via FTP, Telnet resources such as library catalogs, directories of telephone numbers and e-mail addresses, campus-wide information systems, Archie searches, searches of files in all the Gophers in the world, WAIS (see p. 62), and sound and graphics.

At present there are estimated to be some 7,000 Gopher sites on the Net. Gophers are often set up by an organization such as a college, government agency, or commercial business. Gophers vary greatly in the types of resources they provide, because the organization running any given Gopher site decides what resources to put online. For example, a university might have such items as cafeteria menu plans, alumni information, and campus newsletters available at their Gopher site, whereas a commercial organization might have product information on its Gopher.

Internet users can see all this information under one menu-driven system, as if it were in a single set of directories in a single location. By choosing menu items, the user is led to files or to other services available on the Internet. Once you have located a file you want, you also have the option of mailing it electronically, or you could download it via FTP.

Unlike FTP sites, which you have to access one at a time, many Gophers are linked together. Therefore, if you have access to one Gopher, you usually have access to hundreds more. This huge network of Gophers and the vast amount of information they serve is called *Gopherspace*. Once you start following the links from one Gopher to another, you may lose track of which host you are accessing. Most Gophers have a "get information" command that tells you what host you are accessing. This may vary, but it is often an equal sign (=).

▪ How to access a Gopher:

Your system may have a kind of "default" Gopher – that is, typing **gopher** at the system prompt may bring you automatically to a specific Gopher site. You may want to refer to your provider's manual for information about whether or not you have this type of service, which is called a Gopher *client*. See the glossary for more information about clients.

If you want to access a publicly available Gopher client (such as one of the Gophers listed under "Interesting Sites" beginning on page 72), type **gopher** followed by the address of that computer.

USEFUL GOPHER COMMANDS

<RETURN>	select current item
u	go to previous menu
m	go to main menu
<SPACE>	scroll down a page
b or <HYPHEN>	scroll up a page

**A hyphen is used in earlier versions of Gopher Words in brackets denote keys, not typed words.*

Once in Gopher, you'll notice that some items are followed by a slash or other symbol. A slash indicates that there is at least one more menu underneath. A question mark indicates that that item, when selected, will prompt you for search terms and initiate a search. A <TEL> symbol indicates that an item will lead you to a telnet session. If an item is not followed by a symbol, selecting that item will lead directly to an on-screen document.

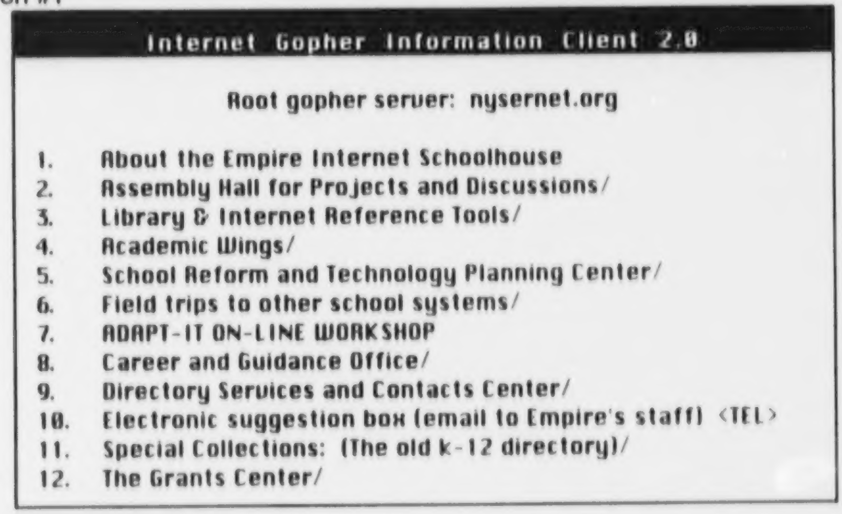
It is possible to bring Gopher resources to your hard disk. Once you are at the end of a text item, type **m**, fill in your address, and the document will be mailed to your electronic mailbox. From there you can download it to a hard drive or to a floppy disk.

A number of Gophers have the word "gopher" as part of their address, such as the one at Office of Educational Research and Improvement: **gopher.ed.gov**. To reach this gopher, you need to type: **gopher gopher.ed.gov** and then press return.

Sample Gopher Session:
Looking for Postings about Collaborative Internet Projects At the "Empire Internet Schoolhouse" Site

The address for the Empire Internet Schoolhouse Gopher is **nysernet.org 3000,** as listed in the "Some Interesting Places to Visit Through the Internet" section. To reach this site, we type **gopher nysernet.org 3000** at the system prompt. Once the connection is made, the following menu appears on our computer screen (it varies slightly in appearance among computers):

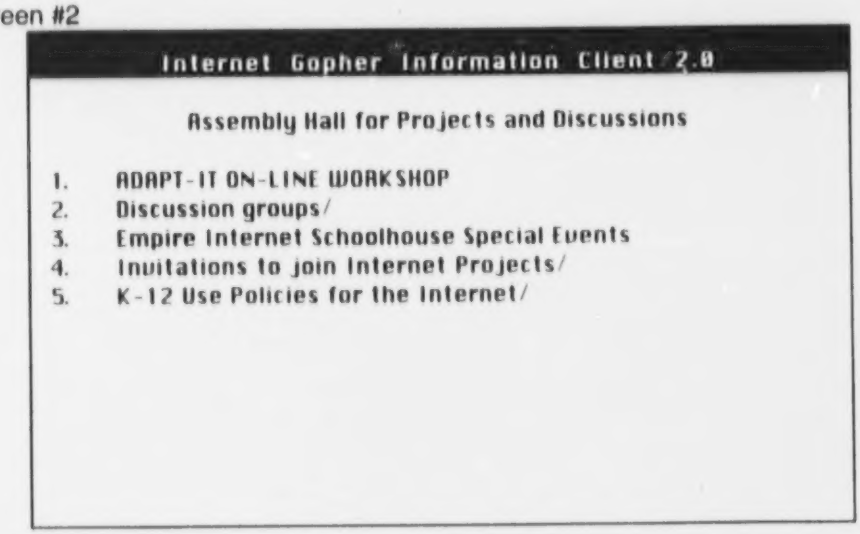
Screen #1



```
             Internet Gopher Information Client 2.0

                Root gopher server: nysernet.org

 1.   About the Empire Internet Schoolhouse
 2.   Assembly Hall for Projects and Discussions/
 3.   Library & Internet Reference Tools/
 4.   Academic Wings/
 5.   School Reform and Technology Planning Center/
 6.   Field trips to other school systems/
 7.   ADAPT-IT ON-LINE WORKSHOP
 8.   Career and Guidance Office/
 9.   Directory Services and Contacts Center/
 10.  Electronic suggestion box (email to Empire's staff) <TEL>
 11.  Special Collections: (The old k-12 directory)/
 12.  The Grants Center/
```

By moving the arrow key to the menu item called "Assembly Hall for Projects and Discussions" on Screen #1, or by typing the number 2 and pressing the return key, we call up the desired menu item to our screen, which looks like Screen #2:

Screen #2

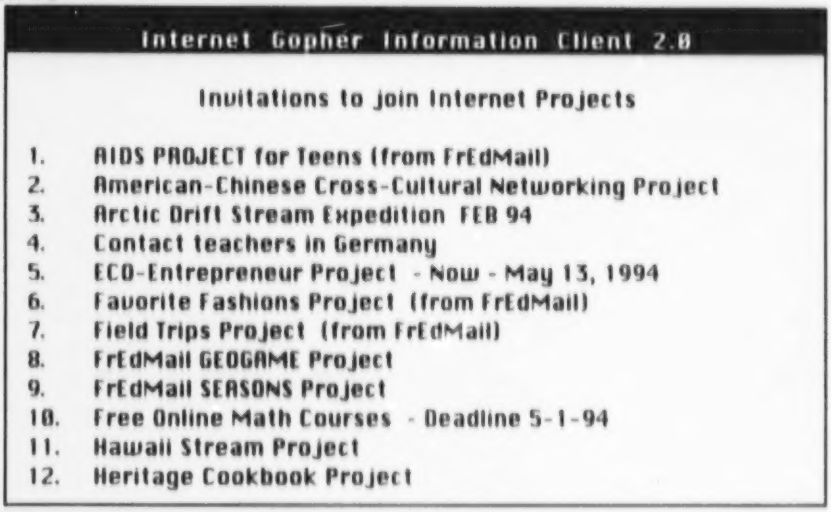


```
             Internet Gopher Information Client 2.0

           Assembly Hall for Projects and Discussions

 1.   ADAPT-IT ON-LINE WORKSHOP
 2.   Discussion groups/
 3.   Empire Internet Schoolhouse Special Events
 4.   Invitations to join Internet Projects/
 5.   K-12 Use Policies for the Internet/
```

Sample Gopher Session (continued)

To find collaborative projects, we select the menu item called "Invitations to join Internet Projects" from the listing on Screen #2. This leads us to a menu of specific projects:

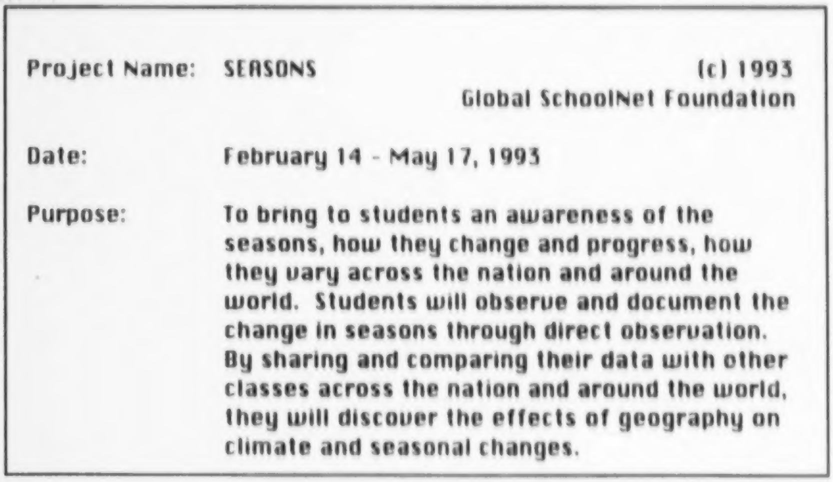
Screen #3



```
            Internet Gopher Information Client 2.0

             Invitations to join Internet Projects

1.    AIDS PROJECT for Teens (from FrEdMail)
2.    American-Chinese Cross-Cultural Networking Project
3.    Arctic Drift Stream Expedition  FEB 94
4.    Contact teachers in Germany
5.    ECO-Entrepreneur Project  - Now - May 13, 1994
6.    Favorite Fashions Project  (from FrEdMail)
7.    Field Trips Project  (from FrEdMail)
8.    FrEdMail GEOGAME Project
9.    FrEdMail SEASONS Project
10.   Free Online Math Courses  - Deadline 5-1-94
11.   Hawaii Stream Project
12.   Heritage Cookbook Project
```

If we wanted to find out about the FrEdMail SEASONS Project, we would select it from Screen #3 (by typing the number 9 or using the arrow keys). Because this item is not followed by a slash, it will lead us directly to on-screen information. (Had it been followed by a slash, we would have known that it would lead us to another menu of choices.) The following information appears on our screen:

Screen #4



```
Project Name:   SEASONS                                   (c) 1993
                                        Global SchoolNet Foundation

Date:           February 14 - May 17, 1993

Purpose:        To bring to students an awareness of the
                seasons, how they change and progress, how
                they vary across the nation and around the
                world. Students will observe and document the
                change in seasons through direct observation.
                By sharing and comparing their data with other
                classes across the nation and around the world,
                they will discover the effects of geography on
                climate and seasonal changes.
```

This is only the first screenful of the document. To read further, press the space bar.

▪ Bookmarks: Create Your Own Gopher Menu

One handy Gopher feature is the *bookmark*. You can use a bookmark to save a menu item, and the next time you want to access that menu, you need only type a simple command, instead of navigating through all of the subdirectories which lead to that particular item. For example, if you often access the "Invitations to Join Internet Projects" menu at the Empire Internet Schoolhouse Site (see previous page), you could make this menu item a bookmark, and you would not need to go through all of the previous menus each time you wanted to read project invitations.

Bookmark Commands:

a	add current item to bookmark list
A	add current menu to bookmark list
d	delete a bookmark
v	jump to bookmark list

Each bookmark you create will be added to your personal customized bookmark list for that particular Gopher site.

Veronica: The "Gopherspace" Searcher

You can use a service within Gopher called *Veronica* to do a keyword search of the information in Gopherspace. From within Gopher, look for a menu item such as "Search Gopherspace Using Veronica" to find out more information about using Veronica.

You may also see a menu item called Jughead on some Gophers. Jughead is very similar to Veronica, except that it searches only a restricted area of Gopherspace, such as the particular Gopher that you are accessing at that time. How did Veronica and Jughead get their names? Some say Veronica stands for "Very Easy Rodent-Oriented Netwide Index to Computerized Archives," and that Jughead is an acronym for "Jonzy's Universal Gopher Hierarchy Excavation and Display." (Jonzy is the name of the person who developed Jughead.) However, the truth is that they were named after characters in the Archie comic strip.

Networks: Where Have You Been All My Life?*

By Rachel , a seventh-grader in Washington, D.C.

As I flipped through my e-mail messages one morning I suddenly received a new one entitled "The Sydney Bush Fires." The mail was from my Australian keypal, and he was telling me and some of his other keypals what it was like to be experiencing the bush fires that were burning all round Sydney. Forgetting all about my other messages for the time being, I quickly wrote back and arranged to go with him to the KIDLINK IRC. On IRC, a place where, amazingly, people can talk back and forth, I was able to ask my friend all about the disaster. It turned out he was less than ten kilometers from the fires, he could see the flame-tinged sky and smell the smoke from his window, and he was able to tell me how far the fires were from the famous Opera House and the Taronga Park Zoo. During the next several days I communicated through e-mail several times more with my Sydney friend, and the fires got even closer to his house. Ultimately he was safe. However, all week long the information about the Sydney fires that I brought to current events in my social studies class was more up to date than anything in the newspapers.

That is only one of my amazing network experiences, but it is one that illustrates the way being on a computer network and having access to the Internet has changed my life in wonderful ways. I was one of the first students and the first girl from my school to get an electronic address on CapAccess, a local public access network in the Washington, DC metropolitan area. Using CapAccess I have learned how to use the library section which is very helpful with my school research projects. In this section I can search for information from a dictionary, a library card catalog, or an article database. This occurred recently when I wrote about the Blue Crab that lives in the Chesapeake Bay. While I couldn't always get the article that I needed, the network told me exactly where to look in my local library.

Being on a network has also expanded my circle of friends. At my school right now there are not many girls who are as interested in network technology as I am, though there are quite a few boys. By joining a listserv called Kidcafe, I have met a group of girls who are just as interested as I am. My friends, especially the girls on the network, write back and forth almost every day, and we have interesting conversations – sometimes about the networking and sometimes about ordinary middle school things. Once in a while we discuss how few girls at our schools seem to be interested in the network. Sometimes we help each other learn how to do new technical things. For instance, my friends in England and Tennessee helped me get started and master IRC. As I get more confident about my networking skills, I hope to share them with my friends at school, encouraging them to discover the opportunities that are available.

I would also like to help my school develop its space on CapAccess. I think it would be fun to have a conversation area or, more importantly, a homework question-and-answer section. This would involve both teachers and students. Because a lot of students would be interested in using the homework section, they would master the basics of networking. I think this is how a lot of people will eventually learn these skills - they will need to do a particular task, and learn the networking part in order to do the job.

These days I cannot imagine how I managed without access to a network. The technology of the network and my activities have made me realize how small the world can be. When I communicate with someone in Slovenia or England or Argentina I realize that the problems that they have are not very far away from me. So even though we are all far away from one another in miles, we are all part of the same global community.

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* *In January and February 1994 the National Center for Education Statistics, the NASA K-12 Internet Project, and the National Science Foundation jointly sponsored an essay contest open to all U.S. students from pre-kindergarten to twelfth grade. In their essays, entitled, "Networks: Where Have You Been All My Life?", students were asked to describe their most significant learning-related telecommunications experience. Several winning essays are scattered throughout this handbook.*

Other Internet Search Tools

We have already discussed the search tools known as Archie and Veronica. The Internet contains some additional tools for locating the information you need. WAIS (Wide Area Information Server) and WWW (World Wide Web, also known as W3 or the Web), offer some special, more advanced capabilities for conducting searches of Internet resources. Unfortunately, though, these systems can be more difficult to use than Archie and Veronica, depending on what kind of software you are using. Another search tool, the White Pages Directories, serves as a resource for locating e-mail addresses. The table below provides an overview of the various Internet search tools:

Internet Search Tools

Archie:	Searches *titles* of files and directories accessed through FTP.
Veronica:	Searches *titles* of Gopherspace menu items.
WAIS:	Searches *contents* of any documents that have been indexed and made available through a WAIS server; includes many kinds of databases, books, bibliographies, library catalogs, network addresses, Usenet archives, Internet information, and Archie databases.
WWW:	Searches all the information on the Internet (such as anything available through Gopher, WAIS, FTP, Usenet, or Telnet), using the special method called hypertext.
White Pages:	Online directories that search for e-mail addresses.

WAIS (Wide Area Information Server)

WAIS provides access to diverse and large Internet databases from a single interface. Through WAIS you can access: books, databases, Internet addresses, software catalogs, library catalogs, Internet information such as lists of Internet services, and archives of Usenet newsgroups and mailing lists.

WAIS is accessible through local WAIS clients, Gopher, and WWW, or by telnetting directly to a few WAIS clients. To try out WAIS, telnet to this public client: **quake.think.com**. Log in as **wais** and follow the instructions on the screen.

Special features of WAIS:

- Unlike Archie and Veronica, which only search the titles of documents, WAIS searches for words in the contents of documents as well.

- Each retrieved document is assigned a score from zero to one thousand, measuring how well the document corresponds to what you want to find (1000 is a perfect fit). The score is based on the frequency of keywords within a document.
- Relevance feedback: you can select retrieved documents that closely match what you want, and these texts will be used by WAIS as keyword sources for further searches.
- WAIS can automatically pull all items of interest together into a single document (weekly, monthly, even daily) to create a personal electronic newspaper.

WWW (World Wide Web)

WWW, a new Internet service, was primarily developed in a European physics laboratory called CERN. Like Gopher, WWW allows access to many Internet sources (WAIS, Archie, Telnet services, databases, text files) from one single platform.

WWW uses a special method called *hypertext* to organize and search information. Whereas traditional libraries are organized hierarchically, hypertext organizes pieces of information in relation to other pieces; documents are interconnected, as if on a web. At any time, you can expand selected words in a document to provide other information. Words are linked to other documents which could be text, files, even pictures. If you want more information about a particular subject or word that is mentioned, you can usually "just click on it" to read in greater detail. (Read the next section, "Mosaic," to learn more about pointing-and-clicking capabilities.) Here are some examples of how hypertext might be used:

- While reading a text in French, you select a phrase, and then hear it as spoken by a native.
- You are reading a legal paper and encounter a term you are not familiar with. Clicking on the term leads you to a dictionary-style definition.

- You are conducting research on volcanoes. By selecting text in a document, you are able to view a computer-generated movie of an erupting volcanoe.

WWW is similar to Gopher in that all Web servers are linked together, and if you have access to one Web server (either a local client or a public client), you have access to many more. The main difference is that WWW is based on hypertext, whereas Gopher is not. To browse through WWW, telnet to **info.cern.ch**. Once you make the connection, follow instructions on the screen.

▪ Mosaic

Mosaic is a "distributed information browsing client" which was developed by the National Center for Supercomputing Applications (NCSA). Mosiac is useful in particular for browsing WWW. It also links to most other common Internet-based services – Gopher, WAIS, FTP, Telnet, Usenet, and directory services.

Mosaic has many advanced features – sophisticated fonts, embedded graphics, and multimedia capabilities, to name a few. Also, Mosaic uses colors to help you keep track of links between WWW documents, and when a link points to something you have already seen, that link is drawn using a special color. This saves you the time of rereading documents you have already seen.

Mosaic's friendly and colorful interface makes the Internet all the more accessible to children and new users in general. However, one disadvantage of Mosaic is that it can be extremely slow.

Mosaic is available via anonymous FTP from **ftp.ncsa.uiuc.edu**. Directory: **/Web/xmosaic-binaries**. The name of the program is **xmosaic**; look for the version for your system.

Mosaic, and most other browsers, require that you have more than the ordinary dial-up connection: you will need SLIP, PPP or other TCP/IP networking on your PC. If you only have normal dial-up access, your best option at this time is to run the browser called "Lynx" on the system you call. "Lynx" is a hypertext browser for vt100 terminal types using arrow keys and highlighting. It is available by FTP from **ftp2.cc.ukans.edu**, or by telnetting to **ukanaix.cc.ukans.edu** (log in as **www**).

White Pages Directories

When you want to contact someone via e-mail but don't know their e-mail address, you can use one of the White Pages directories.

Unfortunately, there is no *one* online telephone book-style directory of Internet addresses. This makes sense, however, when one considers that no one actually runs the Internet, and that Internet addresses are less stable than residential addresses. Instead of one central "telephone book," there are a number of different White Pages directories; when you want to find someone's e-mail address, you will need to develop a strategy for searching these different resources. Here are some sources of e-mail directories:

- **Gopher:** If you know someone's organization (especially if that organization is a university) then the Gopher is the best place to start. Start by looking for a Gopher server for that organization; if you find one, look for a menu item that contains some kind of directory, such as one called "Phone Books." If the organization has no Gopher server, try connecting to the Gopher at Notre Dame University (**gopher.nd.edu**). Choose **Non-Notre Dame Information Sources/Phone Books–Other Institutions**.

- **Whois Servers:** There are many *whois servers* on the Internet, and there are two ways to access them. First, your system may have a command called **whois** (consult your provider or system administrator about this function). The second way to use a Whois server is to telnet to it. For example, to use **whois.internic.net**, enter the command: `telnet whois.internic.net`. Log in as **whois**, or follow any instructions given to you.

- **Netfind:** To use this service, telnet to a Netfind server, such as the following one: **mudhoney.micro.umn.edu**. Login as **netfind**.

- **The Knowbot:** This is an automated program that searches many White Pages directories at once. To use this service, telnet to: **info.cnri.reston.va.us 185** and enter your e-mail address at the prompt.

Section Three

Guide to K-12 Internet Resources

> **IMPORTANT NOTE:**
>
> ***To use many of these resources, you will need some knowledge of Internet services: in particular, the services called FTP, Gopher, Telnet, Usenet, e-mail, and mailing lists. Refer to Section 2: "Accessing Internet Resources" for this information.***

There are many Internet sites of interest to K-12 educators – including publicly accessible files, searchable databases, and discussions geared towards elementary and secondary education. This section serves as a catalog of many of the K-12 Internet resources currently available.

Even if you do not yet have Internet access, you may find that this section is of use to you, since it provides you with an idea of exactly what kinds of resources are available. If you do have Internet access, it is suggested that you try out some of these sites – exploring the Internet yourself will help you to get a better sense of what it is about.

The list of K-12 Internet resources is growing and changing constantly, as more and more organizations offer online services. Keep in mind that some services may change or disappear, and that host computers may be down temporarily or may only permit access during certain hours. One way of keeping up with newly emerging sites and changing addresses is by subscribing to an Internet periodical, such as the magazines and newsletters that are listed in the "Suggested Reading" section. As you discover new Internet resources, you may wish to write down information about them in the table in the back of this handbook.

Newsgroups (Usenet Discussion Groups)

For information on how to access newsgroups, see p. 43.

Name of Group	Discussion Topic
alt.education.disabled	Learning experiences for the disabled
alt.education.distance	Learning over networks, etc.
alt.kids-talk	Discussion among children
comp.security.announce	Announcements from CERT about computer security
k12.chat.elementary	Elementary students forum: grades K-5
k12.chat.junior	Elementary students forum: grades 6-8
k12.chat.senior	High school students forum
k12.chat.teacher	Teachers forum
k12.ed.art	Art curriculum
k12.ed.business	Business education curriculum
k12.ed.comp.literacy	Computer literacy
k12.ed.health-pe	Health and physical education
k12.ed.life-skills	Home economics and career education
k12.ed.math	Mathematics
k12.ed.music	Music and the performing arts
k12.ed.science	Science
k12.ed.soc-studies	Social studies and history
k12.ed.special	Students with handicaps or special needs
k12.ed.tag	Talented and gifted students
k12.ed.tech	Industrial arts and vocational education
k12.edu.life-skills	Especially for school counselors
k12.euro.teachers	Teachers in Europe
k12.lang.art	Language arts
k12.lang.deutsch-eng	German/English practice with native speakers
k12.lang.esp-eng	Spanish/English practice with native speakers
k12.lang.francais	French/English practice with native speakers
k12.lang.russian	Russian/English practice with native speakers
k12.library	Libraries and librarians
k12.sys.projects	Teaching projects
misc.education	The educational system
misc.education.language.english	Teaching English
misc.kids	Children, their behavior and activities
misc.kids.computer	Children's use of computers
news.announce.newusers	New users
pubnet.nixpub	A list of open access Unix sites is often posted here, for those looking for access to Usenet and e-mail only.

Mailing Lists

The "subscription address" is the address for performing official list business, such as subscribing or signing off; the "participation address" is the address for contributing to the actual discussion. See page 47 for instructions on how to subscribe to mailing lists.

List Name	Description
ALTLEARN	**Alternative learning strategies for those with physical disabilities** Subscription address: listserv@sjuvm.bitnet Participation address: altlearn@sjuvm.bitnet
BIOPI-L	**Forum for high school and college biology teachers** Subscription address: listserv@ksuvm.bitnet Participation address: biopi-l@ksuvm.bitnet
CHEMED-L	**Forum for high school and college chemistry teachers** Subscription address: listserv@uwf.bitnet Participation address: chemed-l@uwf.bitnet
COSNDISC	**Consortium for School Networking** Subscription address: listproc@yukon.cren.org Participation address: cosndisc@yukon.cren.org
DOITSEM	**Issues related to individuals with disabilities who are pursuing science, engineering, and mathematics** Subscription address: listproc@u.washington.edu Participation address: doitsem@u.washington.edu
EDTECH	**Educational technology** Subscription address: listserv@ohstvma.bitnet Participation address: edtech@ohstvma.bitnet
KIDCAFE	**Youth dialog** Subscription address: listserv@vm1.nodak.edu Participation address: kidcafe@vm1.nodak.edu
KIDS-95-KIDLINK	**News service about KIDLINK projects** Subscription address: listserv@vm1.nodak.edu
KIDSNET	**Global networking for children and educators** Subscription address: kidsnet-request@vms.cis.pitt.edu Participation address: kidsnet@vms.cis.pitt.edu
KIDSPHERE	**Development of computer networks for students and teachers** Subscription address: kidsphere-request@vms.cis.pitt.edu Participation address: kidsphere@vms.cis.pitt.edu
K12ADMIN	**A list for K-12 educators interested in educational administration** Subscription address: listserv@suvm.syr.edu Participation address: k12admin@suvm.syr.edu

LM_NET **A list for school library media specialists worldwide**
Subscription address: listserv@suvm.syr.edu
Participation address: lm_net@suvm.syr.edu

MIDDLE-L **A list for anyone interested in middle schools**
Subscription address: listserv@suvm.syr.edu
Participation address: middle-l@suvm.syr.edu

PHYSHARE **Sharing of high school physics teachers' classroom teaching strategies**
Subscription address: listserv@psuvm.bitnet
Participation address: physhare@psuvm.bitnet

SIGTEL-L **A list for the Special Interest Group for Telecommunications, a service of the International Society for Technology in Education**
Subscription address: sigtel-l@unmvma.unm.edu
Participation address: sigtel-l@unmvma.unm.edu
(same as subscription address)

STUMPERS-L **Forum for questions that have people "stumped"** (many participants are reference librarians and researchers)
Subscription address: mailserv@crf.cuis.edu
(you must use the **subscribe** command just as you do with a listserv site, except you enclose your e-mail address in angular brackets < and >).
Participation address: stumpers-list@crf.cuis.edu

TECH-ED **Forum for technology educators**
Subscription address: tech-ed-request@fre.fsu.umd.edu

TIPSHEET **Computer help and tip exchange**
Subscription address: listserv@wsuvm1.csc.wsu.edu

VOCNET **Vocational education**
Subscription address: listserv@cmsa.berkeley.edu
Participation address: vocnet@cmsa.berkeley.edu

Collaborative Projects

KIDLINK sponsors annual projects aimed at bringing children ages 10 to 15 into global dialog. In past years, about 10,000 children in 50 countries have participated. (See the KIDS Gopher, p. 76, and "KIDS"-related mailing lists, p. 69.)

ACADEMY ONE of the National Public Telecomputing Network (NPTN) usually has between 5 and 10 projects running at a time. Projects include providing students with remote access to supercomputers, chronological accounts of a day in a student's life, and simulated space shuttle missions. For more information, send e-mail to **aa005@nptn.org**, or telnet to the Cleveland Freenet site (see p. 73).

I*EARN (The International Education and Research Network), a project of the non-profit Copen Family Fund, facilitates telecommunications in schools around the world. For more information, call 914/962-5864 or send e-mail to **ed1@copenfund.igc.apc.org**.

CHATBACK TRUST, initiated to provide e-mail for schools in the United Kingdom and around the world with students who have mental or physical difficulty with communicating, and **CHATBACK INTERNATIONAL** (directed at any school on the Internet) maintain a network server that you may want to investigate (see p. 72).

THE EMPIRE INTERNET SCHOOLHOUSE includes postings of invitations to join Internet projects on its Gopher server (see p. 74 for more information).

THE GLOBAL SCHOOLHOUSE PROJECT, funded by the National Science Foundation, connects students who collaborate on research in areas such as space exploration and alternative energy sources. Live videoconferencing is often included. For more information, send e-mail to **gfitz@cerf.net**.

NEWSDAY, sponsored by the Global SchoolNet Foundation, is a project in which upper elementary through high school students produce local newspapers based on news reports from student correspondents in all participating schools. For more information, send e-mail to **newsday@bonita.cerf.fred.org**.

WORLD'S YOUTH NEWS, sponsored by FreeNet Finland, is a news agency for students which collects and exchanges news written by and for children worldwide. For more information, send e-mail to **wyn@freenet.hut.fi**.

KIDS-WEATHERNET is a weekly exchange of weather data among schools around the world. For more information, send e-mail to **echo@triton.unm.edu**.

MATHMAGIC is a project in which teams engage in global dialog aimed at solving word problems posted in four different grade categories. For more information, send e-mail to **mail-server@forum.swarthmore.edu** with the command **send mathmagic_info**; or access information through the following Gopher server: **forum.swarthmore.edu**.

NATIONAL GEOGRAPHIC'S KIDS NETWORK teams 10-15 geographically dispersed classrooms to do experiments about solar energy, acid rain, weather, nutrition, and recycling. The program tries to teach kids about the scientific method; at the end of the unit, students receive a report from a professional scientist who analyzes their data. The program costs $325-$375 (includes software, a teacher's guide, and workbooks), plus a flat $115 for one school year of online time. For more information, call the National Geographic Kids Network at 202/828-5664.

LEARNING LINK, launched in 1985 by a New York City public television station, partners up schools with local public-TV stations. Projects around the country include online mentoring for novice teachers, nutrition education, an advice column in French for language students, and an online exchange with the governor of Idaho. There is an alternative service called Introlink for areas without a local partner. Call Learning Link at 212/708-3054 for more information.

FREDMAIL, which is primarily a tool for sending student writing from one school to another, has bulletin boards which contain advertisements of networking projects and solicitations for collaborators. (Access to networking projects requires paying the annual subscription fee.) For more information about FrEdMail, call 619/475-4852.

Interesting Sites to Visit Through the Internet

As you explore the Internet, you will quickly encounter many new resources beyond the sites mentioned on the following pages. For instance, many Gophers listed here contain links to other K-12 resources on the Net. Space has been provided at the back of this handbook for noting information about new sites. Be advised that teachers or administrators should review a newly discovered site before recommending it to students, because it might contain material that is objectionable for school-age children.

Several of these sites can be accessed in more than one way. For example, the AskERIC site can be accessed via Gopher (listed as the first option) or via Telnet (listed as the second option). For Gopher sites, information often is included as to which menus should be selected (once the connection is established) in order to reach a particular menu item.

AskERIC

Provides information for K-12 educators, such as ERIC Digests, lesson plans, archives of education-related discussions, and information on conferences, and allows you to ask questions. In response, you will receive an ERIC search providing information about your question, plus full texts of any ERIC Digests that deal with your question.

1) Gopher: ericir.syr.edu

2) Telnet: ericir.syr.edu
   Login: gopher

Census Bureau

Provides online access to statistics and information from the Census Bureau, as well as news releases, tip sheets, and information about the organization itself.

Gopher: gopher.census.gov

Chatback Trust and Chatback International

Chatback Trust is an organization that was originally concerned primarily with school children with various types of language disorders. Chatback International is the expansion of that project onto the Internet and is concerned with the use of networks to educate all children.

Telnet: rdz.stjohns.edu
Login: student
(Follow login instructions on screen.)

Children Youth Family Research Network (CYFeR-net)

Run by the USDA extension service, this gopher site contains a wide variety of information related to children, such as a Food and Nutrition Information Center and information about the Partnerships Against Violence program.

Gopher: ace.esusda.gov

The Cleveland Freenet

Contains a vast amount of information in fields such as history, the arts, and science. Also provides an up-to-date news service. Of particular interest to educators is the Academy One, which is a National Public Telecomputing Network experimental program designed to meet the information and communication needs of students and educators.

Telnet: freenet-in-a.cwru.edu
or freenet-in-b.cwru.edu
or freenet-in-c.cwru.edu
or kanga.ins.cwru.edu
(Follow instructions on screen.)

Consortium for School Networking

The Consortium for School Networking is a membership organization of institutions formed to further the development and use of computer network technology in K-12 education. To contribute your ideas, lesson plans, projects, etc., for others to access over the Internet, send e-mail to: **ferdi@digital.cosn.org**. The Gopher and Telnet sites offer information about computer networking (Internet access, tools, training), plus lots of information about education-related Internet sites and educational projects on the Internet.

1) Gopher: cosn.org

2) Telnet: cosn.org
Login: gopher
(no password)

CRESST (The National Center for Research on Evaluation, Standards, and Student Testing)

Provides a database of alternative approaches to assessment.

Gopher: spinoza.cse.ucla.edu

Cornucopia of Disability Information (CODI)

A disability information site, which includes a directory of disabilities organizations and information on disability legal issues.

Gopher: val-dor.cc.buffalo.edu

CTY (Center for Talented Youth)

Contains items such as the organization's newsletter, information on summer programs, and writing tutorials.

Gopher: jhuniverse.hcf.jhu.edu

Distance Education Database

Contains information on distance courses and institutions offering these courses. Literature searches can also be conducted.

Telnet: acsvax.open.ac.uk
Username: ICDL
Account Code: USA
Password: aaa

DO-IT (Disabilities, Opportunities, Internetworking, and Technology)

Contains information about Project DO-IT (whose purpose is to increase the participation of people with disabilities in science, engineering, and technology), as well as disability-related resources and pointers to science and math sites on the Internet.

Gopher: hawking.u.washington.edu

E-Math

Primarily for math educators and professionals, this resource provides online access to employment opportunities, software, and a variety of math publications, as well as discussions on math-related topics and pointers to other math-related Internet resources. The American Mathematical Society (AMS) maintains and supports E-Math.

1) Gopher: e-math.ams.org

2) Telnet: e-math.ams.org
Login: e-math
Password: e-math

The Eisenhower National Clearinghouse for Mathematics and Science Education (ENC)

A resource through which teachers can locate instructional materials for teaching science and mathematics for grades K-12. ENC collects, stores, and disseminates materials to teachers nationally.

1) Gopher: enc.org

2) FTP: galileo.enc.org

Empire Internet Schoolhouse

Provides a wide variety of K-12 resources, including discussion groups, some college admissions databases, and invitations to collaborate on Internet projects.

1) Gopher: nysernet.org 3000

2) Telnet: nysernet.org
Login: empire (no password)

ERIC Clearinghouse on Assessment and Evaluation

Contains the Test Locator service, which has several searchable testing databases, tips on how to best evaluate a test, and information on fair testing practices.

Gopher: gopher.cua.edu
Choose the following menu items:
  Special Resources
  ERIC Clearinghouse on Assessment and Evaluation

ERIC Clearinghouse on Elementary and Early Childhood Education (ERIC/EECE)

This site allows you to read information about ERIC/EECE, access the full text of digests published by ERIC/EECE between 1991 and 1994, and read recent issues of the ERIC/EECE newsletter.

1) Gopher: prairienet.org
Choose the following menu items:
  Education Center
  ERIC
  ERIC/EECE

2) Telnet: prairienet.org
Login: visitor
Password: hit return, type nothing
Follow prompts, then type **go eric**

ERIC Database

Allows users to search the ERIC Database (1983 - present), housed at the University of Saskatchewan Library System. Searchable fields include author, title, descriptor, identifier, publication year, ERIC accession number, and journal title.

Telnet: sklib.usask.ca
At USERNAME prompt, enter **sonia**
At main menu, "Education Databases"
Select 1, CIJE plus RIE: 1983 to Present
Type **help** to see a summary of search and display commands

ERIC Digests Archives

Allows users to search ERIC Digests (short overviews on topics of interest to educators) online.

1) Telnet: bbs.oit.unc.edu
Login: launch
Follow directions on screen for registration. At the main menu, choose number 4, "Topical Document Search (WAIS)," and move to ERIC Digests. For help in WAIS, type a question mark.

2) FTP: ericir.syr.edu
Path: /pub

3) E-mail: askeric@ericir.syr.edu
(In your message ask for the topic in which you're interested. A human will answer you via e-mail.)

4) Gopher: ericir.syr.edu

Fedix/Molis

Contains information on scholarships and minority assistance.

Telnet: fedix.fie.com
Login: fedix

Geographic Name Server

Gives geographical information for U.S. cities and counties by name, state, and zip code.

Telnet: martini.eecs.umich.edu 3000

Georgia College EduNet

A large collection of online resources for K-12 educators, including CNN Curriculum guides, a software evaluations library, Georgia Quality Core Curriculum, and multimedia file exchanges.

Telnet: gcedunet.peachnet.edu
(Registration is required; follow instructions on screen.)

Gopher Jewels

A compilation at the University of South Carolina of some of the best that Gophers offer, grouped by subject area.

Gopher: cwis.usc.edu
Choose the following menu items:
Other Gophers and Information Resources
Gopher Jewels

IKE

Offers IBM Kiosk for Education User Discussion Forums – forums for educators about how they are using IBM systems for instruction and research.

Telnet: isaac.engr.washington.edu
Login: register
(Registration is required.)

InforMNs (Internet for Minnesota Schools) Gopher

A menu item at this site, "Best of K-12 Internet," provides a grab bag of interesting Internet resources, documents, and projects for schools. Examples include reports from Antarctica and information on the Wolf Project.

Gopher: informns.k12.mn.us

International Arctic Project

The International Arctic Project, whose team will attempt a record-setting crossing of the Arctic Ocean in March 1995, is making the daily progress of its training expedition available via Gopher.

Gopher: gopher.econet.apc.org
Choose the following menu items:
Environment
International Arctic Project

International Society for Technology in Education (ISTE)

This is the repository of ISTE information and articles. ISTE is an organization dedicated to improvement of education through computer-based technology.

1) Gopher: iste-gopher.uoregon.edu
Choose: Search Titles in This Gopher Server
Enter ISTE when asked what to search for.

2) Telnet: gopher.uoregon.edu
Login: gopher (no password)
Choose: Search Titles in this Gopher Server
Enter ISTE when asked what to search for.

InterNIC

Contains general information about InterNIC, as well as an InterNIC directory and an updated directory of Internet service providers.

1) Gopher: is.internic.net

2) Telnet: is.internic.net
Login: gopher
(no password)

KIDS Gopher (a KIDLINK service)

Contains information about KIDLINK services, projects, and people. KIDLINK is a global dialog for children.

1) Gopher: kids.duq.edu

2) Telnet: kids.duq.edu
Login: gopher
(No password)

Library of Congress' MARVEL system

Offers a wide range of U.S. government information, including the full text of congressional bills. The on-line catalogue of the Library of Congress is also available, and this site has links to other on-line catalogues around the world.

Gopher: marvel.loc.gov

Literacy Research Center/National Center on Adult Literacy

Contains a wide variety of information on literacy issues.

Gopher: litserver.literacy.upenn.edu

MicroMUSE

A combination of real-time "chat" group and role-playing science fiction game. Useful as an activity for acquainting students with computer networking, as well as an exercise in creativity.

Telnet: michael.ai.mit.edu
Login: guest
Terminal type: vt100
At the prompt "Please enter your command:" type: **connect guest**

NASA Spacelink

Provides access to National Science Foundation publications, phone directories, and announcements.

1) Telnet: spacelink.msfc.nasa.gov
   Login: newuser
   Password: newuser
   (Follow on-screen instructions.)
   To find information on the NASA Teacher Resource Center Network, enter **g** for GO TO, then enter **TRC**.

2) FTP: spacelink.msfc.nasa.gov

National Parent Information Network

A national electronic network for parents and parent educators, community planners, and others who work with parents and families.

1) Gopher: prairienet.org
   Choose the following menu items:
     Education Center
     ERIC
     Nat'l Parent Information Network

2) Telnet: prairienet.org
   Login: visitor
   Password: hit return, type nothing
   Follow prompts, then type **go eric**

National Science Foundation's (United States) Science and Technology Information System (STIS)

Offers discussion, help, and a number of interesting topics for those interested in science and technology.

1) Telnet: stis.nsf.gov
   Login: public

2) Gopher: stis.nsf.gov

Newton

This is a bulletin board system for anyone teaching or studying science, math, or computer science.

Telnet: newton.dep.anl.gov
Login: bbs
(Follow registration instructions.)

Ocean Network Information Center (OCEANIC)

An interactive database of research information; includes information on the World Oceanic Circulation Experiment and research ship schedules.

Telnet: delocn.udel.edu
Login: INFO

Office of Educational Research and Improvement (U.S. Department of Education)

Contains educational research and statistics, as well as information about the U.S. Department of Education, including information on the National Diffusion Network (education programs that work).

Gopher: gopher.ed.gov

Online Reference Resources

This site contains materials such as a dictionary, a thesaurus, the Periodic Table of Elements, a Shakespeare glossary, and much more.

Gopher: library.calpoly.edu
Choose the following menu items:
  Cal Poly Library Services
  Online Reference Resources

Project Gutenberg

Project Gutenberg is attempting to make over 10,000 public domain books freely available over the Internet as electronic text. Many sites carry information about this project, including the electronic texts themselves. Here are some of those sites:

1) Gopher: mizzou1.missouri.edu
   Choose the following menu items:
   Columbia Online Information Network
   Reference and Information Center
   Project Gutenberg

2) FTP: mrcnext.cso.uiuc.edu
   Change to directory: /pub/etext

3) E-mail: send a message to almanac@oes.orst.edu with the words **send gutenberg catalog** in the body of the message. (You will receive a catalog of available texts, and instructions on how to word requests in order to receive the e-texts.)

4) Electronic newsletter about Project Gutenberg: to subscribe, send e-mail to listserv@vmd.cso.uiuc.edu with the following message:
   sub gutnberg *your name*

PSGnet and RAINet

Offers information about computer networking in general, and more specifically low-cost networking and networking in the developing world.

1) Telnet: gopher.psg.com
   Login: gopher
   (no password)

2) Gopher: gopher.psg.com

Radio Free Europe Daily Reports

Digests of the latest developments in Russia and Eastern Europe, among other areas.

Gopher: gopher.indiana.edu
Choose the following menu items:
  The University
  Academic Support Services
  Russian & Eastern European Institute
  Radio Free Europe Daily Reports

SEFAIN: South East Florida AIDS Information Network

A collection of information about AIDS issues, doctors, research, hospitals, and drugs.

Telnet: callcat.med.miami.edu
Login: library
(Entering a library system of which SEFAIN is one)
Select "L" on the main menu for other libraries
Select "1" on the submenu for SEFAIN Database

Services

Provides access to many other Telnet sites by selection, without reconnecting through the Telnet prompt. This eliminates the need to know hundreds of other addresses, since a menu system is used.

Telnet: library.wustl.edu

Smithsonian Institution's Natural History Gopher

Offers resources on subjects such as botany and zoology, as well as information on the Smithsonian Biodiversity Program and the Laboratory of Molecular Systematics.

Gopher: nmnhgoph.si.edu

Social Security Administration's Gopher

Contains information on Social Security numbers and retirement, as well as statistics on the agency's programs.

1) Gopher: gopher.ssa.gov

2) Telnet: gopher.ssa.gov
Login: gopher

Special Internet Connections (The "Yanoff List")

Compiled by Scott Yanoff, this is a regularly updated list of diverse places to visit on the Internet, such as sites offering interactive chess games, earthquake information, and archives of food recipes.

1) FTP: ftp.csd.uwm.edu
Change to the pub directory
Get file called inet.services.txt

2) Usenet: posted to a number of newsgroups, including **comp.answers**

St. John's University Gopher

Contains disability and rehabilitation resources, as well as pointers to education-related Internet sites, resources for K-12 teachers, and virtual reality worlds.

Gopher: sjuvm.stjohns.edu

TC Forum

Education-related discussion groups and downloadable files; also, you can be linked with Nebraska's educational institutions and educators.

Telnet: tcforum.unl.edu
(Follow instructions on screen.)

Trainmat

A Gopher set up to promote network training. A range of network training materials are accessible through this site, as well as texts of Internet guides.

1) Gopher: trainmat.ncl.ac.uk

2) FTP: ftp.ncl.ac.uk
Change to the directory:
pub/network-training/trainpack

VocServe

An electronic bulletin board for vocational education. Provides discussion forums and chat services. Access requires payment of a modest annual fee.

Telnet: vocserve.berkeley.edu
Login for first-time users: NEW
(Follow registration instructions on screen.)

University of California at Santa Cruz Gopher

Contains links to many Internet resources, such as online libraries and Usenet archives, as well as pointers to every Gopher on the planet (which numbered almost 7,000 at last count).

1) Gopher: gopher.ucsc.edu

2) Telnet: infoslug.ucsc.edu
   Login: gopher

Weather Underground: A Complete U.S. Weather Service

Complete, easy to use online weather service covering forecasts for U.S. regions and cities.

Telnet: madlab.sprl.umich.edu 3000

Youngstown Freenet

The Youngstown Freenet provides a variety of services and information, simulating services provided by a city. Includes discussion forums, postings on recent legal developments, and an "Animal Hospital" (a place to ask questions of veterinarians).

Telnet: yfn2.ysu.edu
Login: visitor

Examples of Educational Projects Using the Internet

The following examples of projects using the Internet appeared on the Kidsphere electronic mailing list during the 1993-94 school year. The messages have been edited in the interest of space, but the information presented can give you a feel for the types and range of projects that are happening today.

FOLKLORE PROJECT

"Folklore, Anyone?" is a multi-curricular project in which students from all ages, grades, and classes produce a collection of folklore (preferably in the form of a book). Students gather the folklore from either library research or field research and from the dispatches sent by other classes through the Internet. Students become researchers, interviewers, editors, layout and graphics artists, and publishers. This project can involve your students in weeks of cross-curricular activity; the project can lead students in many different directions.

Schools may use a wide variety of methods to produce the collections, ranging from simple word processor cut and paste to full desktop publishing packages.

Participants will receive a book, newspaper, or some kind of hard copy that represents all of the lore that has been collected.

Many content areas may be included during the project. By deciding what kind of lore you want to research, you can focus on just about any content area.

Examples of folklore:

- Nursery bogey – the lore used to scare children and keep them from doing something bad. For example, Jenny Greenteeth (in England) is a monster who lives in the lake, and when children venture near the lake she pulls them into the water and eats them with her green teeth.
- Folk poetry – ranges from oral epics to limericks, jump-rope rhymes, and nursery rhymes.
- Social folk customs: holidays and festivals, pranks, folk medicine, folk dance.

Remember, the best folklore is in the form of field research. Have students interview their grandparents and learn about their beliefs and customs. What games did they play? What are some proverbs, folk sayings in their family? What folk crafts did they have?

PROJECT – SPRING YET?

Purpose

Students 30 miles north of St. Paul, Minnesota want to follow, record, plot on a map and create a data table of "spring" as it moves towards them (we in the north get a kick out of this sort of thing).

Participants

Any number of all age groups located in U.S. and Canada.

Summary

All schools are invited to become a "spotter" for "our" signs of spring. We want to track "our" traditional signs of spring northward. The first time one of the below events occurs, please notify us so we can record and plot it. We would also like to know if any of our signs are common all year long in your area (for example, if robins are in your back yard at this present time).

Your payback would be a weekly update of sightings reported to us. This would also allow you to follow "spring" northward after it passes you by.

We have brainstormed the following "Spring Events" that occur in our area and realize that all of them do not occur in all communities. These are the events we look forward to after a long cold winter. The project will be limited to the following events:

1. First robin.
2. First goose or duck.
3. First buds on any trees or bushes.
4. First sprigs of green grass.
5. First peepers (tiny frogs) or other frogs heard singing.
6. First thunderstorm.
7. First loon.
8. First insect (found outside).
9. 50% of ice gone on an approximate 1000 acre lake.
10. Opening of first area golf course. ;-)

Procedure

1) Send the coordinator your registration information, including your city, state, latitude and longitude, contact person name, and e-mail address. You will then receive all updates.
2) When you register indicate which one of the below choices applies, in your area, for each of the events:
   a) has not occurred yet;
   b) does not apply to our area;
   c) has already happened -- give date;
   d) is always present in our area.

WANTED: 4TH OR 5TH GRADE CIVIL WAR PARTNERS

I am teaching a 4/5th grade group in Illinois and I would like to find a partner class to exchange learnings, insights, reflections on the war. This might include a trivial pursuit component, but I would like the emphasis to be on an exchange of reflections, connections, summary of discussions, exchange of insights on historical fiction connected to the Civil War. Contact immediately...school year is waning.

CALL FOR PROJECT – CALIFORNIA QUAKE

There is a grade 11 geography class in Ontario, Canada that would be interested in communicating with a group of students in California who experienced the recent earthquake. The tone of the discussion might be informal, touching on the human aspects of such an event.

MONARCH BUTTERFLIES

We are a fifth grade class in Chicago, Illinois. We are studying the monarch butterflies. We would like to know if you have seen any monarch butterflies lately, and if so, we have some questions for you.

1) Where have you seen them?
2) What were they doing?
3) If you saw them eating, what kind of milkweed were they eating?
4) What time did you see them? (month, day, season)
5) What atmosphere were they in?
6) What condition were their wings in? (tattered or intact)
7) What city, state, country are you in?

ELEMENTARY SCHOOL NEWSPAPER EXCHANGE

I have been working with a group of 3-4th graders (in West Virginia) on publishing a school newspaper each month. We have been exchanging newspapers with four other schools within our state and this has given the students new ideas and models to compare their work.

I was wondering if there were schools in other places, particularly elementary schools, that would be interested in exchanging copies of their newspapers. We will send a copy of our newspaper, if you can send us one of yours. Thanks in advance.

TO KILL A MOCKINGBIRD: A CONVERSATION ABOUT RACISM

Purpose

To allow high school students from different regions of the country to discuss racism both in *To Kill A Mockingbird* and in our local experiences.

Summary

To Kill A Mockingbird is set in Depression-era Alabama, yet the issues it raises are still real today. We would like to begin a conversation between our students and students who live in other regions of the country about some of the issues in Harper Lee's novel. We envision a series of three weekly conversations between our tenth grade students and others across the country. By writing either as a whole class or as individuals, we would like students to consider such questions as:

- How does the demographic makeup of Scout's hometown influence the events of the novel?
- What is the nature of our own hometown population?
- What does Mockingbird assert about law and justice for the different characters in the book?
- How have current events in our own communities recently reflected how law and justice are applied to all members of our communities?
- How do the young Scout, Jem, and Dill perceive racial and social diversity?
- How do we as students see diversity as influential factors in our lives?

VISION OF MARS: CHILDREN'S ART CONTEST

About Visions of Mars

A Russian spacecraft is going to be launched in 1994 on a mission to the planet Mars. Nestled inside the mars lander will be a unique CD-ROM – a disc containing classic science fiction stories in many languages, science fiction art and greetings from the people of Earth. The disc is being produced by The Planetary Society and Time Warner Interactive Group with assistance from IKI (The Russian space agency), JPL (Jet Propulsion Lab), and many others. It is our hope that this disc will be discovered, and enjoyed, by future human visitors to Mars.

About the Contest

The Visions of Mars Children's Art Contest is an attempt to get the children of Earth involved in this unique project. Children ages 4-12 (grades K through 6) are invited to submit an original artwork of Mars. You may show us the Mars of yesterday, today, or tomorrow; real or imagined. The winning artwork will be included on the Visions of Mars CD-ROM, and will be launched to the planet Mars. One day, perhaps, the artist will get the opportunity to retrieve it.

Suggested Additional Reading

Some of these items are described as being available online. Refer to the FTP information beginning on page 51 for instructions on getting documents electronically.

Books and Articles

Andres, Y.M., M. Jacks, and A. Rogers. *TeleSensations: The Educator's Handbook to TeleComputing.* Bonita, California: The FrEdMail Foundation, 1994.

The cost is $39.00 (includes S/H); 5 or more copies cost $35.00 (includes S/H). To order call 610/ 475-4852, or make checks or money orders out to:

FrEdMail Foundation
P.O. Box 243
Bonita, CA 91908-0243

Dearn, D. *The Internet Guide for New Users.* Washington, DC: McGraw-Hill, Inc., 1994.

Estrada, S. *Connecting to the Internet.* Sebastopol, CA: O'Reilly & Associates, Inc., 1993.

Fraase, M. *The Mac Internet Tour Guide.* Chapel Hill, NC: Ventana Press, 1993.

Fraase, M. *The PC Internet Tour Guide.* Chapel Hill, NC: Ventana Press, 1994.

Hahn, H., and R. Stout. *The Internet Complete Reference.* Berkeley, CA: McGraw-Hill, Inc., 1994.

Incomplete Guide to the Internet and Other Telecommunications Opportunities Especially for Teachers and Students K-12. Champaign, IL: NCSA Education Group, July, 1993.

online:
ftp.ncsa.uiuc.edu
Education/Education_Resources/Incomplete_Guide

To order a hardcopy, contact one of the following people:

Valerie Sheehan
NCSA Education Group
605 E. Springfield Ave.
Champaign, IL 61820
vsheehan@ncsa.uiuc.edu

Lisa Bievenue
NCSA Education Group
605 E. Springfield Ave.
Champaign, IL 61820
bievenue@ncsa.uiuc.edu

The cost of the publication is $15 plus $5 shipping and handling.

Kehoe, B. *Zen and the Art of the Internet: A Beginner's Guide.* Englewood Cliffs, NJ: Prentice-Hall, 1992.

online:
University of Michigan Gopher
gopher.citi.umich.edu
Internet Documents/zen

Krol, E. *The Whole Internet User's Guide & Catalog*. Sebastopol, CA: O'Reilly & Associates, Inc., 1992.

LaQuey, T. *The Internet Companion: A Beginner's Guide to Global Networking*. Reading, MA: Addison-Wesley Publishing Company, 1992.

Levine, J.R., and C. Baroudi. *The Internet for Dummies*. San Mateo, CA: IDG Books Worldwide, Inc., 1993.

Marine, A., S. Kirkpatrick, V. Neou, and C. Ward. *Internet: Getting Started*. Englewood Cliffs, New Jersey: Prentice-Hall, 1993.

Sivin, J.P. and E.R. Bialo. *Ethical Uses of Information Technologies in Education*, 1992. Washington, DC: U.S. Department of Justice, Office of Justice Programs, National Institute of Justice.

The cost is $9.00. To order, call 800/851-3420 from within the United States or 301/251-5500 from outside of the United States. Or write to:

U.S. Department of Justice
Office of Justice Programs
National Institute of Justice
Washington, DC 20531

Magazines

Magazines are an excellent way to keep up-to-date with developments in cyberspace; a few are listed here. Check a computer bookstore for these magazines, or contact them using the information given below.

Connect is a bimonthly magazine that covers all kinds of online services – not just Internet, but also BBSs and national commercial services such as America Online and Prodigy and contains extensive listings of BBSs. Subscription rates are currently $18.00 for one year (6 issues). To charge a subscription, call 800/GET-CONNECT. Or send a check or money order to:

CONNECT
3487 Braeburn Circle
Ann Arbor, MI 48108

Internet World is a monthly magazine (except for July/August, November/December) that contains a wide variety of articles and tips on the Net, for beginners as well as more experienced users. Subscription rates are $29.00. Address subscription orders to:

Internet World
P.O. Box 713
Mt. Morris, IL 61054

Online Access is published ten times a year (monthly except for January/February and July/August), and contains information on many online services. Subscription rates are $29.70. To subscribe to the magazine, call 800/36-MODEM or send mail to:

Online Access
5615 W. Cermak Rd.
Cicero, IL 60650-2290

Newsletters

Classroom Connect is a monthly newsletter that contains practical advice on such matters as using the Internet to find instructional materials, designing an online project, and obtaining grants for getting online. One subscription at the teacher rate costs $39 per year (9 issues); two subscriptions at the school library rate amount to $67 per year. To subscribe, call 800/638-1639, send e-mail to the attention of Janice Brown at success@wentworth.com, or write to the following address:

Classroom Connect
1866 Colonial Village Lane
P.O. Box 10488
Lancaster, PA 17605-0488

The Educator's Internet Newsletter is published six times yearly (August, October, January, March, May, and June). Articles in the first issue included the following: Internet resources provided by local school systems, information about Archie, and Internet resources for music teachers. Subscription rates are $18.00 per year. Send checks or money orders to the following address:

Educator's Internet Newsletter
P.O. Box 7085
Golden, CO 80403-0100

NetTeach News is published monthly from August to March and bi-monthly April/May and June/July. It is written for both the novice and the experienced networking teacher. Recent topics include announcements of new education-related Internet sites, a listing of conferences around the country involving education and technology, information on government-sponsored telecommunications grants, and "What's New in K-12 Mosaics."

Annual hardcopy subscription costs are: $22.00 for individuals in the US; $25.00 for individuals in Canada; $30.00 for individuals outside the US and Canada; and $30.00 for institutions. Annual ASCII electronic copy costs are $15.00 for individuals. Add $5.00 to hardcopy costs to receive both ASCII and hardcopy. Site licensing is available for public elementary and secondary education networks. Discounts are available for school district multiple subscriptions.

For a subscription form, questions, or to submit materials, contact:

Kathy Rutkowski, Editor
Chaos Publications
13102 Weather Vane Way
Herndon, VA 22071
Phone: 703/471-0593. E-Mail: info@netteach.chaos.com

Videos

The NASA NREN (U.S. National Aeronautics and Space Administration National Research and Education Network) K-12 Initiative has produced an 11-minute video describing the benefits to schools of using the Internet. The video is entitled "Global Quest: The Internet in the Classroom," and it tells the story through interview clips with students and teachers. For a copy, contact:

NASA Central Operation of Resources for Educators (CORE)
Lorain County Joint Vocational School
15181 Route 58 South
Oberlin, OH 44074
Phone: 216/774-1051. Fax: 216/774-2144.

The fee for the video is $15.00 plus $3.50 shipping and handling. You may also make a copy yourself by taking a blank copy to the nearest NASA Teacher Resource Center or by taping from NASA Select Television.

The National Center for Education Statistics in the Office of Educational Research and Improvement at the United States Department of Education has released a 17-minute video targeted at school administrators entitled "Experience the Power: Network Technology for Education." It uses interview clips of students, teachers, and policy makers in the United States to educate about what the Internet is and to encourage support for the use of telecommunications in elementary and secondary schools. For a copy of this video, contact the following address. If you contact them via e-mail, be sure that you send your mailing address:

National Center for Education Statistics
555 New Jersey Ave. N.W., R. 410 C
Washington, D.C. 20208-5651
Phone: 202/219-1364. E-Mail: ncesinfo@inet.ed.gov. Fax: 202/219-1728.

FYIs and RFCs (Online Files About the Internet)

FYI (For Your Information) Notes and RFCs (Request for Comments) are documents created by the Internet community to help address general and technical Internet issues. The FYI Notes is a subseries of RFCs, and it is of particular interest to new Internet users.

The FYI series is available for downloading by FTP by typing:

```
ftp ds.internic.net
cd fyi/fyi##.txt     (where ## is the number of the FYI)
```

Also, Internic sells individual RFCs for $20-25 each. Send orders to the following address:

Internic
P.O. Box 85608
San Diego, CA 92186-9784
Phone: 619/455-4600 Fax: 619/455-3990

Here is a list of FYIs that provide a useful overview of the Internet:

FYI 4	"FYI on Questions and Answers: Answers to Commonly asked 'New Internet User' Questions," Malkin, G.S. and A. Marine. (fyi4.txt or rfc1594.txt)

FYI 5	"Choosing a Name for Your Computer," Libes, D. (fyi5.txt or rfc1178.txt)
FYI 8	"Site Security Handbook," Holbrook, J.P. and J.K. Reynolds. (fyi8.txt or rfc1244.txt)
FYI 16	"Connecting to the Internet: What Connecting Institutions Should Anticipate," ACM SIGUCCS Networking Task Force. (fyi16.txt or rfc1359.txt)
FYI 18	"Internet Users' Glossary," LaQuey Parker, T. and G. Malkin. (fyi18.txt or rfc1392.txt)
FYI 19	"Introducing the Internet–A Short Bibliography of Introductory Internetworking Reading for the Network Novice," Hoffman, E. and L. Jackson. (fyi19.txt or rfc1463.txt)
FYI 20	"What is the Internet?" Krol, E. and E. Hoffman. (fyi20.txt or rfc1462.txt)

Some Other Online Files About the Internet

"Ednet Guide to Usenet Newsgroups"
online: nic.umass.edu
pub/ednet/edusenet.gde

Get this file by typing:

```
ftp nic.umass.edu
cd pub/ednet
get edusenet.gde
```

"Educator's Guide to E-Mail Lists"
online: nic.umass.edu
pub/ednet/educatrs.lst

"Guide to Network Resource Tools," EARN Association. May 1993. 64 pp.
online: ds.internic.net
pub/internet-doc/EARN.nettools.ps
and pub/internet-doc/EARN.nettools.txt

or via e-mail:
Send a message to LISTSERV@EARNCC.BITNET. Leave the subject blank and in the first line of the body, enter GET NETTOOLS TXT for the plain ASCII text format, or GET NETTOOLS PS for the PostScript version.

Internet Resource Directory for Educators
online:
tcet.unt.edu
Four separate files:

1) pub/telecomputing-info/IRD/IRD-telnet-sites.txt (a listing of education-related Telnet sites)
2) IRD-ftp-archives.txt (a listing of education-related FTP-accessible archived files)
3) IRD-listservs.txt (a listing of education-related mailing lists)
4) IRD-infusion-ideas.txt (ideas for the use of telecomputing tools in education and training)

Glossary

The following is a short glossary of Internet-related terms, most of which are used in this handbook. For a more complete glossary of Internet terms, refer to FYI 18 (RFC 1392), "Internet Users' Glossary." Some of these definitions are excerpted from that glossary. (See the "Suggested Reading" section.)

Acceptable Use Policy (AUP)

A policy stating the conditions or restrictions that apply to the use of a network. For example, a school's acceptable use policy might state that a student is not allowed to use another student's password. Many network providers providing dial-up connections require that you agree to their AUP.

ASCII (American Standard Code for Information Interchange)

ASCII is a lowest common denominator computer language that virtually any computer can read and use, either directly or after converting it.

address (Internet e-mail address)

All Internet e-mail addresses follow the same simple structure: a user's login name (also known as "userid"), followed by the "@" sign, followed by the name of the host computer on which the user has an account. The name is expressed in a string of *domains* which are separated by periods. Domains contain information about the organization with which the user has an Internet account; the last domain is usually one of seven abbreviations, such as "com" for commercial institution, "gov" for government, or "edu" for educational.

anonymous FTP

This term refers to the method of accessing data via the File Transfer Protocol using the special username "anonymous." This was devised as a way to provide access to public data. (Access to other data on the same system may be restricted, however). Users who wish to acquire data from a public source may use FTP to connect to the source, then use the special username "anonymous" and their e-mail address as the password to log into a public data area. *Full-privilege FTP* allows access to nonpublic areas, if a special password is entered. For example, students and faculty at a university with full-privilege FTP accounts may have many more resources available to them than an "anonymous" user sees. See also: File Transfer Protocol (FTP).

Archie

A software program, accessible by Telnet and some Gophers, that allows users to search over 2 million anonymous FTP files. Archie provides the FTP address and directory information, and the user can ftp to the site to download the files. See also: Anonymous FTP.

archive

An organized holding of computer files stored for later retrieval. Examples are an anonymous FTP archive or collections of mailing lists or discussion groups.

BBS

See: Electronic Bulletin Board System.

bps (bits per second) or Baud Rate

A data transmission rate expressed in 1000 bit per second units. Transmission speeds typically used by personal computers and service providers range from 1200 to 14,400 (often referred to as 14.4). Higher connection speeds are becoming the standard. File download is quicker with higher connection speeds. The speed rate between your computer and modem must be compatible with that of your provider.

client

A computer or process that relies on the resources of another computer or process (the server). An example of this is the Gopher service. When you use a Gopher, two different programs are involved: the program called the "client," which provides your interface (displays menus, interprets your keystrokes, etc.) and the program called the "server," which supplies whatever the Gopher client has requested on your behalf. If you have your own Gopher client installed on your system or your provider's system, you can normally access it by typing **gopher** at the system prompt. Other Gophers, in contrast, must be accessed by typing **gopher** followed by the full Internet address. You may also have a WAIS client or a WWW client, accessible by typing **wais** or **www**, respectively, at the system prompt. See also: Server.

communications software

Communications software allows your computer to communicate with your modem, and therefore to access other computers. Communications software is necessary if you are connected to the Internet via dial-up means. Specific capabilities of your communications software program include: instructing your computer to dial and connect to another computer's modem; allowing you to type in information to be sent to the remote computer; receiving and displaying the remote computer's information on your screen; and printing information to your printer. See also: Terminal Emulator.

cracker

A person who maliciously uses computer knowledge to cause damage to computers and data. (This term is often confused with the term "hacker," which refers to a person who delights in having an intimate understanding of computer systems.)

cyberspace

Coined by William Gibson in his novel *Neuromancer*, this term describes the conceptual "space" in which human minds and networks meet on the Internet.

dial-up (also dial-in)

A temporary, as opposed to dedicated, connection, usually made via modems, between two computers (or servers) over telephone lines.

download

To copy data, information, or graphics from a remote computer to a local computer. The opposite of upload.

DSU/CSU (Data Service Unit/Channel Service Unit)

The digital equivalent of a modem. A Channel Service Unit connects to a telephone company-provided digital data circuit, and a Data Service Unit provides the electronics required to connect digital equipment to the CSU. Paired together, a DSU/CSU allows computer equipment to be connected into the telephone digital service for highly conditioned, high-speed data communications.

electronic Bulletin Board System (BBS)

A computer, and associated software, that typically provides electronic messaging services, archives of files, and any other services or activities of interest to the bulletin board system's operator. Although BBSs have traditionally been the domain of hobbyists, an increasing number of BBSs are connected directly to the Internet, and many BBSs are currently operated by government, educational, and research institutions.

e-mail (electronic mail)

A system whereby a computer user can exchange messages with other computer users (or groups of users) via a communications network.

FidoNet

A network of computers interconnected using the FIDO dial-up protocols. The FIDO protocol provides a means of "store and forward" file transfer similar to UUCP.

file transfer

The copying of a file from one computer to another over a computer network. See also: FTP (File Transfer Protocol).

flame

An e-mail message or posting to a newsgroup that is hostile or goes on at lengths about an absurd topic. Flames are intended to provoke other users, and are considered to be extremely bad netiquette. See also: Netiquette.

Frequently Asked Question (FAQ)

A question that is often posed to a particular discussion or newsgroup. So that these questions do not keep reappearing and overwhelming the discussion, they are compiled and distributed in files called FAQs. Most newsgroups post their FAQs.

FTP (File Transfer Protocol)

A protocol that allows a user on one host to access, and transfer files to and from, another host over a network. Also, FTP is usually the name of the program the user invokes to execute the protocol.

FYI (For Your Information)

A subseries of RFCs that are not technical standards or descriptions of protocols. FYIs convey general information about topics related to TCP/IP or the Internet, and are of particular interest to new users. All FYIs can be found as differently-numbered RFCs. See also: RFC.

Gopher

A distributed information service that links many types of information from all around the Internet and presents it to the user in a series of menus. Because hundreds of Gopher servers cooperate in providing access to information and services, the user sees a single, uniform interface to information that actually resides on different host computers. (The format of the interface and the commands you need to use are uniform; however, the actual menu items will differ on different Gopher servers.) The Gopher interface is very easy to use, and public domain versions of the clients and servers are available. See also: Veronica.

Gopherspace

Gopherspace refers to the huge network of Gophers, and the vast amount of information they serve. Gophers are linked together over the Internet. Because of this link, once you have access to one Gopher, you usually have access to hundreds more. The menu items in Gopherspace can be searched using a tool called Veronica.

hacker

A person who delights in having an intimate understanding of the internal workings of a system, computers and computer networks in particular. The popular media has corrupted this term to give it the pejorative connotation of a person who maliciously uses computer knowledge to cause damage to computers and data. The proper term for this type of person is "cracker."

host computer

Any computer that has a *direct* (not dial-up) connection to the Internet is technically considered a host computer, even if it does not share any resources with the rest of the Internet. This term is most often used, however, to refer to a computer which shares its resources with other computers who access the host computer by means such as Telnet, Gopher, and FTP.

hypertext

Text that is accessed or stored in a non-hierarchical structure. Each piece of hypertext is connected to other pieces of hypertext by links.

hytelnet

An easy-to-use software package that contains a list of many Telnet accessible resources, which can automate logins to these sites. Hytelnet has a great selection of online library catalogs.

Internet

The worldwide network of computer networks that exchanges information.

Internet Relay Chat (IRC)

A worldwide party-line style chat service that allows one to converse with other Internet users in real time.

Internet Engineering Task Force (IETF)

The IETF is a large, open community of network designers, operators, vendors, and researchers whose purpose is to coordinate the operation, management, and evolution of the Internet, and to resolve short-range and mid-range protocol and architectural issues. It is a major source of protocol proposals and standards.

InterNIC

A Network Information Center (NIC), funded by the National Science Foundation, that provides information about the Internet. The InterNIC is a team of three contractors, each of which focuses on a particular network support task. The three tasks are: Information Services (the task most often cited in this document), Registration Services, and Directory and Database Services.

LAN (Local Area Network)

A data network intended to serve an area of only a few square kilometers or less. Since such networks are relatively small they can usually be directly controlled by the users and operate at relatively high speeds over inexpensive wiring.

leased line

A leased line is a special phone company permanent connection between two locations. Leased lines are generally used where high-speed data are continually exchanged between two computers (in the Internet, generally between routers).

listserv (mailing list server)

An automated program that accepts mail messages from users and performs basic operations on mailing lists for those users. In the Internet, listservs are usually accessed as "listname@host"; for example, the list server for the hypothetical list "newsreports@acme.org" would be called "listserv@acme.org." Sending e-mail to "newsreports@acme.org" causes the message to be sent to all the list subscribers, while sending a message (to subscribe or unsubscribe, for example) to "listserv@acme.org" sends the message only to the list server. When e-mailing to a list server, requests must be worded in specific ways to achieve specific purposes (see p. 47). Not all mailing lists use list servers to handle list administration duties.

Local Area Network (LAN)

See LAN.

mailing lists

A mailing list is used to discuss a specific set of topics, and different mailing lists discuss different topics. A mailing list may be moderated; that is, messages sent to the list are actually sent to a moderator who determines whether or not to send the messages on to everyone else. Many mailing lists are maintained by a "listserv" (list server) program that automatically handles operations such as adding new people to the list. In the Internet, for those mailing lists maintained by a person, rather than by a listserv, you can generally subscribe to a list by sending a mail message to "listname-REQUEST@host" and in the body of the message enter a request to subscribe. To send a message that goes out to all other participants, you will then use the address "listname@host." For example, if you want to subscribe to the hypothetical mailing list "math@usa.edu," send a message to "math-request@usa.edu"; if you want to contribute to the discussion, send a message to "math@usa.edu."

modem (MODulator/DEModulator)

A device that converts the digital signals used by computers into analog signals needed by voice telephone systems. Modems can be "dial" or "leased line" type. Dial type modems are used on normal telephone lines to call remote computers, and usually operate at speeds between 1,200 and 14,400 baud (bits per second).

Mosaic

A distributed information browsing client, used to present information for the World Wide Web (and can also be used with most other Internet services, such as Gopher, WAIS, and FTP). It has many advanced features, such as embedded graphics. It also uses colors to help the user keep track of links between documents. See also: World Wide Web.

the Net

An abbreviation for the word "Internet."

netiquette

Network etiquette; refers to rules of proper behavior for those on a network. Violations of netiquette include: flaming, sending chain letters, using the Internet for commercial purposes in forums where that is not appropriate, and posting a question to a newsgroup without first checking its file of Frequently Asked Questions, to see if the question has been answered there.

network provider (network service provider, network access provider)

Any organization that provides network connectivity or dial-up access. Service providers may be corporations, government agencies, universities, or other organizations.

network

Two or more devices connected together in such a way that they can exchange data with each other.

Network News

Another name for "Usenet News."

NIC (Network Information Center)

A central place where information about a network within the Internet is maintained. Usually NICs are staffed by personnel who answer user telephone calls and electronic mail, and provide general network usage information and referrals, among other possible tasks. Most network service providers also provide a NIC for their users.

node

Any computer that is directly connected to the Internet. A more technical synonym for the term "host." See also: Host computer.

online

A broad term which refers to the state of being connected to another computer for the purpose of using its resources or communicating with people.

port

TCP/IP assigns at least one address to a host computer, but applications such as FTP must talk to a corresponding server application (program) on the host. The "port" is the way TCP/IP designates the remote application. Most common Internet applications have specific port numbers associated with them. For example, Telnet uses port number 23. These are known as "well-known ports" and allow application programmers to write standard applications (such as Telnet, FTP, etc.) that "know" where the corresponding server is on a particular host. By default, ordinary Telnet connections are made using port number 23; when you do not specify a port number, the Telnet program automatically connects using port 23. Some hosts, however, require that you specify a particular port number (not the number 23) when you make the connection. All you have to do is enter the port number at the end of the Telnet command, making sure to leave a space between the address and the port number.

PPP (Point to Point Protocol)

A protocol used to establish TCP/IP connections using serial lines such as dial-up telephone lines. Similar to SLIP (see below), PPP is a later standard that includes features such as demand dial-up, compression, better flow control, etc.

protocol

A formal description of message formats and the rules two computers must follow to exchange those messages. Protocols can describe low-level details of machine-to-machine interfaces (e.g., the order in which bits and bytes are sent across a wire) or high-level exchanges between allocation programs (e.g., the way in which two programs transfer a file across the Internet).

provider

See: Network provider.

remote computer

A host computer which, while not near one's own computer in physical location, is accessible through the Internet. This term is used most often to refer to a computer that can be accessed to initiate a Telnet or FTP session.

RFC (Request for Comments)

The document series, begun in 1969, that describes the nuts and bolts of the Internet. Some RFC documents are written for beginning users, whereas others are aimed at those desiring advanced technical assistance. RFCs are available online and can also be ordered by telephone.

router

A computer that forwards traffic between networks. A router may be used in a district or school network to permit simultaneous access to and use of one phone line by several people on the network.

server

A computer or device that provides a resource to other computers or devices on the network. There are many types of servers on the Internet, such as listserv mail servers and Gopher servers. In both cases, these servers are programs running on a distant supercomputer, and once accessed via e-mail, telnet, or some other appropriate method, they will provide requested resources. See also: Client.

signature (sig)

The three- or four-line message at the bottom of a piece of e-mail or a Usenet article that identifies the sender. Large signatures (over four lines) are generally frowned upon.

SLIP (Serial Line Internet Protocol)

A protocol used to establish TCP/IP connections using serial lines such as dial-up telephone lines. Small computers, such as PCs and Macintoshes, can use SLIP to dial up to servers, which then allow the computer to act as a full Internet node. SLIP is generally used at sites with a few users as a cheaper alternative than a full Internet connection – but one that is more expensive than a typical dial-up service. SLIP is being replaced by PPP at many sites.

smiley

Smileys are used in e-mail messages to convey that something is meant in jest, or simply to communicate an emotion which typed words cannot convey. A standard smiley consists of a colon, a hyphen, and a parenthesis, and looks like a smiling face when viewed sideways, like so: :-)

system prompt

Once you have logged in to your Internet session, you will see your provider's system prompt. A system prompt could be any word or string of characters; consult your provider's manual to find out what your own system prompt is. When you are at the system prompt, the system is waiting to accept your commands, such as the command to initiate a Telnet or FTP session.

Talk program

This service allows two Internet users to communicate in real-time fashion. See also: Internet Relay Chat.

TCP/IP (Transmission Control Protocol/Internet Protocol)

TCP/IP designates two of the major communications protocols used within the Internet (TCP and IP). These protocols (along with several others) provide the basic foundation for communications between hosts in the Internet. All of the service protocols, such as FTP, Telnet, Gopher, use TCP/IP to transfer information.

Telnet

Telnet is the Internet standard protocol for remote terminal connection service. The name "Telnet" is also used to refer to programs that allow interactive access to remote computers, as well as the action of using these programs. For example, the phrase "telnet to host xyzzy" means to log in to host xyzzy.

terminal emulator

A program that allows a computer to emulate a terminal. This is necessary because of the wide variety of methods used by different computers for encoding and sending information; terminal emulation software typically allows emulation of a variety of terminal types. In order to connect to the Internet via dial-up means, you must have a communications package with terminal emulation abilities.

upload

To copy data from a local computer to a remote computer. The opposite of download.

Usenet News

An electronic bulletin board system created originally by the Unix community and which is accessible via the Internet. Usenet News forms a discussion forum accessible by millions of users in almost every country in the world. Usenet News consists of thousands of topics arranged in a heirarchical form. Major topics include "comp" for computer topics, "rec" for recreational topics, "soc" for social topics, "sci" for science topics, etc. Within the major topics are subtopics, such as "rec.music.classical" for classical music, or "sci.med.physics" for discussions relating to the physics of medical science.

userid (User identification)

Pronounced "user-eye-dee." This term refers to two things: 1) the part of an Internet address that precedes the "@" sign (i.e., the userid for ers@access.digex.net is "ers"), and 2) the name by which a user has authorized access to a computer system (i.e., if you establish a full-privilege FTP account somewhere, you will have a unique userid that is different from your e-mail address). See also: Address.

UUCP (Unix-to-Unix CoPy)

This was initially a program run under the UNIX operating system that allowed one UNIX system to send files to another UNIX system via dial-up phone lines. Today, the term is more commonly used to describe the large international network which uses the UUCP protocol to pass news and electronic mail.

Veronica

Veronica is a service available within Gopher which searches Gopherspace. Veronica looks for menu items containing the key words you have entered. Veronica is usally found on a Gopher under a menu such as "Search Gopherspace Using Veronica" or "Other Gophers and Information Servers." See also: Gopher, Gopherspace.

virus

A portion of a computer software program that infects computer systems by replicating itself into other programs that are shared among computer systems. Most viruses are intended to disrupt operations on computers into which they have been introduced. A virus is "caught" either through electronic transmission of files (such as downloading through the Internet) or through use of diskettes duplicated by an infected machine.

virus protecter

Computer software designed to search for the presence of a computer virus on all new programs being loaded on the computer system. Once a virus is found, it is removed. Inexpensive virus protection software is readily available and should be installed on all computer systems.

WAIS (Wide Area Information Server)

A distributed information service that offers simple natural language input, indexed searching for fast retrieval, and a "relevance feedback" mechanism that allows the results of initial searches to influence future searches. Anything that is indexed and made available through a WAIS server can be searched using WAIS.

WAN (Wide Area Network)

A network designed to cover large geographical areas.

White Pages

By analogy to telephone directories, an online listing of e-mail addresses and other information about network users. There is no one online directory of all Internet addresses. The Internet supports several databases that contain on-line listings of e-mail addresses. These databases can be searched to get information about particular individuals. Examples of White Pages directories include: Whois, Netfind, and Knowbot.

Wide Area Network (WAN)

See WAN.

WWW (World Wide Web)

A distributed information system that uses a special method called *hypertext* to organize and search information. Hypertext organizes pieces of information in relation to other pieces; documents are interconnected, as if on a web. If you want more information about a particular subject or word that is mentioned, you can usually "just click on it" to read in greater detail. Many other servers such as WAIS and Gopher have been incorporated into the WWW servers.

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Your Personal Resource List

The extent to which you find the Internet to be a valuable tool depends upon your own personal use of it – who you contact, where you look for information, and the resources you discover. Also, when new sites of interest appear on the Net, or when a site address changes, it is important to make note of the information. This section of the Handbook *is included to let you create your own personalized resource lists.*

E-Mail Addresses

Name of Person/Organization	E-Mail Address

E-Mail Addresses

Name of Person/Organization	E-Mail Address

OTHER SITES I HAVE FOUND

Site Name	Type (FTP, Gopher, etc.)	Purpose	Address	Login and Other Commands

110

111

OTHER SITES I HAVE FOUND

Site Name	Type (FTP, Gopher, etc.)	Purpose	Address	Login and Other Commands

OTHER SITES I HAVE FOUND

Site Name	Type (FTP, Gopher, etc.)	Purpose	Address	Login and Other Commands

Comments and Suggestions About
The Internet Handbook for School Users

Your comments do not necessarily need to be submitted on this form, but please do provide name and address information when you send in your comments. Address your information to Nancy Protheroe or Elizabeth Wilson at Educational Research Service, 2000 Clarendon Boulevard, Arlington, VA 22201.
Phone: (703) 243-2100. Fax: (703) 243-8316. E-mail: ers@access.digex.net

Contact Person: ____________________
Position: ____________________
School District/Agency: ____________________
Address: ____________________
City: ____________ State: ________ Zip: ________
Telephone: ____________ Fax: ____________
E-mail: ____________

Comments and Suggestions:

How The Internet Has Been Used in Your School or School District

Educators can help each other to expand the value of the Internet as an educational resource by sharing information about their experiences and programs.

School District: ______________________________

Superintendent: ______________________________

District Enrollment (K-12): ____________ pupils

Type of Community:

☐ Urban ☐ Rural

☐ Suburban ☐ Small Town

Contact Person: ______________________________

Position: ______________________________

Address: ______________________________

Telephone: ______________________________

Fax: ______________________________

E-mail: ______________________________

Ways in which Internet has been put to use in your school or district:
(Please attach materials if any are available.)

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Please send information to Nancy Protheroe or Elizabeth Wilson at Educational Research Service, 2000 Clarendon Boulevard, Arlington, VA 22201.
Phone: (703) 243-2100. Fax: (703) 243-8316. E-Mail: ers@access.digex.net

Notes

Quick Reference Sheet for Internet Commands

LISTSERV COMMANDS

help	send summary of basic commands
info ?	send list of information topics
info *topic*	send information about specified topic
list global	send summary of all Bitnet mailing lists
review *list*	send information about specified list
subscribe *list your name*	subscribe to specified mailing list
set *list* digest	receive one daily bundle of mail from a list
set *list* nomail	stop receiving mail temporarily
set *list* mail	receive mail again
unsubscribe *list*	leave the list permanently
signoff	same as unsubscribe

FTP COMMANDS

cd	change directory
cdup	go to parent directory
get	transfer a file
mget	transfer multiple files
dir	list directory of files, with byte sizes
ls	list files
pwd	print working directory
bye	quit

ARCHIE COMMANDS

prog *keywords*	searches for keywords
whatis *keywords*	searches for files with the keywords as a topic
set search exact	searches for the exact words entered (case sensitive)
set search sub	searches to match substring anywhere in filename
set maxhits *number*	tells Archie the maximum number of items you want to find
set sortby time	results of the search will be displayed from newest to oldest

GOPHER COMMANDS

<RETURN>	select current item
u	go to previous menu
m	go to main menu
<SPACE>	scroll down a page
b, or <HYPHEN>*	scroll up a page
a	add current item to bookmark list
A	add current menu to bookmark list
d	delete a bookmark
v	jump to bookmark list

**A hyphen is used in earlier versions of Gopher.*

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